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EDITOR OF THE MONTH
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Rochester, Minnesota

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MANAGEMENT AND CARE OF THE INFANTILE PARALYSIS PATIENT *

EDWARD L. COMPERE, M.D.

CHICAGO, ILLINOIS

The term "infantile paralysis" is a misnomer. It suggests that the disease is primarily one of infants. The more technical designation, "acute anterior poliomyelitis," is almost equally inaccurate. "Polio," a perfectly satisfactory substitute for the longer name, is a systemic disease and not a localized infection of a portion of the central nervous system. The marked susceptibility of the anterior horn cells in the spinal cord to the virus may result in paralysis of the peripheral muscles. This paralysis may include only one or two muscles or it may be generalized. The distribution is variable and rarely symmetrical.

During the past few years there have been changes in the principles of treatment of patients who have become victims of "polio." Treatment of acute "polio" has produced a sharp difference of opinion between those who advocate convalescent serum and those who consider it to be of no real value. In Chicago and throughout the Middle West the majority of the patients for whom an early diagnosis is made receive convalescent serum. Studies made in the Edward Deutch Serum Center of the Michael Reese Hospital have been interpreted as evidence of the value of the serum in combating the virus of acute anterior poliomyelitis. No doubt some physicians prescribe the serum because there is nothing else for them to try. The "sulfa drugs" are of no value in the treatment of this virus disease.

The principal change in trend of therapy of "polio" has resulted from the introduction into the United States of the concept and methods of Miss Elizabeth Kenny. Whether they wish to admit it or not, most physicians, including most orthopedic surgeons who have had the opportunity of treating victims of acute anterior poliomyelitis either in 1942 or in 1943, have modified the program of management of their "polio" patients because of the Kenny influence.

The Kenny concept of infantile paralysis may be new, but the principles of treatment which Sister Kenny advocates are not revolutionary. For the most part the Kenny treatment is good nursing care and a lot more of it than the average "polio" patient formerly received. It is good physical therapy begun much earlier than in the past we considered to be wise. Heat as a method of soothing irritated tissues is one of the oldest forms of therapy utilized by mankind. The moist heat in the form of hot packs recommended by Miss Kenny and begun immediately after the diagnosis of acute anterior poliomyelitis is made does not prevent paralysis, but spasm of muscles is relieved, the patient is made more comfortable, and if positioning of the patient in bed is well controlled, fixed deformities will be prevented fully as well as by means of the rigid splints or plaster casts formerly used by me and by most of my medical colleagues. Beginning in 1942 I have used prostigmine in addition to the hot packs, and there is evidence that this hastens the recovery from the muscle spasm.

The duty of the orthopedic surgeon to whom the infantile paralysis

* Read at the Twenty-second Annual Session of the American Congress of Physical Therapy, Chicago, September 11, 1943.

patient is referred when the period of quarantine has ended is to prevent deformity and to the fullest extent possible to lessen the crippling effect of the virus injury to the motor cells in the anterior horns of the spinal cord. If the patient does not have the benefit of wise counsel during the first few weeks of illness, the first task of the orthopedic surgeon may be the correction of deformity. Prevention of contractures of muscles or disalignment of joints or of curvature of the spine is much to be preferred to any program of correction after the deformity has developed. The principles of treatment advocated by Miss Kenny represent a dynamic program of treatment. The methods followed by most of us before Miss Kenny dropped a bomb shell in our midst were largely static. Rest and rigid immobilization for many weeks resulted in atrophy of disuse, loss of joint motion, regional circulatory retrogression and fibrosis of muscles because of persistent passive congestion. Owing in no small degree to the influence of Miss Kenny, most physicians today have abandoned rigid splinting and treat their patients by means of moist hot packs, and early passive motion and, as soon as pain is relieved, by active motion.

My own observations lead to the conclusion that the earlier the program of treatment of peripheral manifestations is begun the better are the end results. Our efforts are directed at the relief of muscle spasm, at the prevention or correction of incoordination and of mental alienation and at the restoration of function of muscles which are not totally paralyzed but need reeducation. Spasm of a muscle if persistent may lead to fibrosis with contracture and deformity. Spasm is most common and intractable in the muscles of the spine and those of the backs of the thighs. A stiff neck or stiff back, with pain on flexion of the thigh with the leg extended at the knee, is not normal. Microscopic sections of a muscle that is in spasm show a pathologic picture of passive congestion. This passive congestion may be relieved by the combination of hot packs, passive motion and active exercise.

Few diseases are more variable in their manifestations than is acute anterior poliomyelitis. In 1942 I was privileged to see, examine and treat 67 victims of this disease. Without an exception, these patients had muscle spasm. All had stiff backs and tight hamstring muscles. Not all of them had actual paralysis. Nine of the 67 had no demonstrable paralysis, and yet they were severely disabled by the peripheral manifestations of muscle spasm and incoordination and mental alienation. As is true in all instances, the real paralysis was not cured by the treatment, but spasm and stiffness were relieved, although they persisted longer in victims of the 1942 season than in those of other years.

Chicago experienced an epidemic of infantile paralysis during the last few weeks of the summer of 1943. The manifestations this year were vastly different from those of 1942. The incidence of death, which is in direct proportion to the incidence of the bulbar type of involvement, was higher than in 1942. The severity of paralysis was less, however, among those patients who survived the initial infection. In 1942 a very high percentage of patients were adults. Still more of them were adolescents. Only a few were small children. Most of the victims of the disease in 1943 were under 10 years of age. The extreme involvement of spinal muscles, with rigid, board-like stiffness of the back, which was present in patients coming directly from the Contagious Disease Hospital in 1942, even though they had been given the Kenny treatment while in quarantine, was in striking contrast to the condition of most of the patients seen in 1943. The amount of muscle spasm with stiff back was much less. Recovery from the muscle spasm in 1943 was spectacularly rapid.

We are not able to explain these marked differences in the manifestations of acute anterior poliomyelitis in successive years. However, this should impress us with the fact that we should not attempt to compare the results of treatment of acute anterior poliomyelitis by any methods used in one year with the results of any other method used in any other year. The disease may be different in its manifestations from year to year that the method of treatment in a large number of cases has little to do with the final result.

There is reason to believe that curvature of the spine, which so often afflicted the patients suffering from infantile paralysis who were treated by methods prior to the Kenny treatment, may be much less frequent because we are paying so much attention to the spine and to correcting the spasm of the spinal, pelvic and thigh muscles. I have seen no more than 4 slight lateral curvatures in more than a hundred patients treated under my direction by the Kenny method during the past three years. I am of the opinion that the incidence of severe scoliosis will be less when the Kenny treatment to relieve muscle spasm and to restore muscle length and spine mobilization is carried out.

Colonna,¹ professor of orthopedic surgery at the University of Pennsylvania, has reported that in 150 cases, or 30 per cent of 500 consecutive cases of infantile paralysis that he studied, curvature of the spine developed. No doubt many of us have overlooked mild spinal curvatures in our own patients. On the other hand, every orthopedic surgeon has in years past observed too many ghastly spinal deformities, which were so severe and so rigid that no treatment was of much, if any, value. We are watching for curvatures now, and there is some evidence from our recent experience that if the spine is kept mobile, so that there is neither spasm nor fibrous tissue contracture, severe curvatures, which constituted almost a hopeless problem, can be minimized or actually prevented. If true, this fact alone will have justified the use of the principles recommended by Miss Kenny. Actual paralysis may not be reduced as a result of the Kenny treatment, but there is less permanent crippling due to muscle fibrosis and shortening, and less scoliosis may be anticipated.

The orthopedic surgeon must still prescribe braces to protect the paralyzed lower extremities when walking is permitted. We must perform tendon transplants and, when to do so is indicated, stabilize feet by fusion operations. The number of patients who will require such surgical intervention may be as large as when the patients received other types of treatment. There is evidence gained by observation, however, that the patients will be in better condition generally and will have better circulation in the paralyzed extremities if they are given the benefit of at least the general principles of treatment by hot packing, early activity, exercises and good physical therapy designed to cure incoordination and muscle alienation.

My own plan of treatment includes some Kenny and some orthodox methods.

Outline of Care for the "Polio" Patient

A. *Acute Stage.*

1. Strict contact isolation and quarantine.
2. Convalescent serum immediately if it is available.
3. Hot moist packs changed every hour for twelve hours each day.
4. Respirator at the first indication of cyanosis or dyspnea; continue hot packs with the patient in the respirator.
5. Gentle passive motion of all extremities at least once each day.

B. Subacute Stage.

1. Cursory orthopedic examination with minimal manipulation.
2. Careful positioning with hard mattress and foot board.
3. Hot pack to hamstrings and spine in all patients in whom there is stiffness of the neck, hamstring muscles or back.
4. Hot pack to muscles of all extremities in which there is tenderness or evidence of spasm.
5. Prescribe prostigmine bromide; for adults 30 mg. together with 1/100 grain (0.6 mg.) of atropine sulfate three times a day, given simultaneously; children of 12 to 14 years, prostigmine bromide, 20 mg., and atropine sulfate, 1/200 grain, three times a day; younger children, prostigmine bromide, 10 to 15 mg., three times a day without atropine; all given orally.
6. Physical therapy consisting of passive exercises with encouragement of active motion.
7. Correction of incoordination and of mental alienation through the Kenny principle of combined patient and physical therapist concentration and cooperation.
8. Mobilization of the spine by sitting the patient in bed with the knees completely extended; this also lengthens the hamstring muscles if they are tight or shortened.
9. Permit free activity for at least one hour each morning before the hot packs and each afternoon after the hot packs.
10. Early attempts at standing and walking.
11. Continue hot packs and stretching of tight muscles, but not those in spasm, until there is complete flexibility of the spine. In children this should be to the point where they are able to sit on the floor or on a firm mattress with the knees completely extended and bend forward until the head rests on the knees.

C. Chronic Stage.

1. Braces for patients who have foot drop or who have total paralysis of the quadriceps muscle. No braces for the upper arms or spine are being used at the present time. Abdominal support in the form of a corselet has been found to be worth while.
2. Operations such as tendon transplants, when indicated, may be performed within six months after all muscle spasm has disappeared. Arthrodeses for stabilization should be deferred in most instances until at least one year after all muscle spasm has disappeared.
3. The spine must be observed frequently and free mobility maintained. If scoliosis becomes apparent in a child whose longitudinal growth lies mostly in the future, a prophylactic spinal fusion may be in order.

While this program of care cannot cure paralysis, it helps the patient to use to the best possible advantage such muscles as have not been destroyed by the virus action on the spinal cord.

Reference

1. Colonna, P. C., and vom Saal, F.: A Study of Paralytic Scoliosis Based on Five Hundred Cases of Poliomyelitis, *J. Bone & Joint Surg.* **23**:335 (April) 1941.



MEDICAL REHABILITATION IN THE VETERANS ADMINISTRATION *

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The purpose of this paper is to provide general information as to the facilities of the Veterans Administration that are now available for the treatment of veterans. It will be necessary to discuss a variety of subjects in a brief manner. It may be stated at the outset that all Veterans Administration hospitals have met the standards and received the approval of the American College of Surgeons.

The Veterans Administration hospitals are located at strategic points throughout the United States in such variety and numbers as the veteran population requires. Each hospital is staffed with full time civil service employees, furnishing hospital and outpatient treatment to those persons who are eligible to receive this service under existing laws. Part time consultants are also employed as required, to supplement the full time medical staff, and are selected on the basis of their professional attainments in special fields of medicine and surgery. The majority of the members of our consultant staffs are associated with medical schools in a teaching capacity.

Hospitals

Our hospitals are divided into three general classes, namely, those receiving patients suffering from general medical and surgical diseases, from neuropsychiatric diseases and from tuberculosis. Regulatory instructions and methods of procedure have been adopted so that the administration and conduct of all the hospitals are carried on in a uniform manner. Admission can be authorized only if all legal (entitlement under existing laws) and medical (need of hospital care) requirements are met.

There are at present 93 Veterans Administration facilities with a total standard bed capacity of 61,800 beds. Thirteen of these facilities, with a total bed capacity of 5,695, are devoted to the treatment of veterans suffering from tuberculosis. Twenty-nine facilities, with a total bed capacity of 33,824, are devoted to the treatment of neuropsychiatric diseases. Fifty-one facilities, with a total bed capacity of 22,281, are devoted to the care of patients suffering from general medical and surgical conditions. Each of these facilities is equipped to furnish outpatient examinations and treatment to veterans entitled thereto under existing laws. Such examinations may be used to determine the need of treatment, the eligibility for hospital care, compensation or pension, or for government insurance purposes.

The outpatient department is also charged with the duty of arranging for veterans who are legally entitled thereto emergent hospital or home treatment. The arrangements are made through private physicians employed on a fee or part time basis and titled designated examiners by the Veterans Administration. Designated examiners have been appointed in various communities throughout the country.

All patients admitted to Veterans Administration facilities are assigned to the reception service for clinical classification, except that those requiring emergent treatment may be sent direct to the service under whose jurisdic-

* Read at the Twenty-second Annual Session of the American Congress of Physical Therapy, Chicago, September 10, 1943.

tion the treatment of the major disability falls.

In hospitals caring for tuberculous patients, the general grouping is as follows: surgical, infirm, semiambulant and ambulant. In neuropsychiatric hospitals the patients are grouped into those who are acutely disturbed, those requiring continuous treatment and those suitable for privilege of the grounds, etc. Patients who have convalesced sufficiently from mental illness may be granted trial visits to their homes under supervision of their relatives. These grants are given only after social service investigation reveals that the environment is suitable for the trial visit of the patient. All relatives and visitors to this type of patient are contacted by a psychiatric social worker and the ward surgeon, and a record of each visit is kept.

The grouping of patients in our general medical and surgical hospitals depends on the bed capacity. Each general hospital has a medical and a surgical service. The subdivision of these services into units depends on the variety of clinical material, as well as on the specialistic types of services that are available. In some of our larger hospitals the surgical service is divided into units caring for patients suffering from eye, ear, nose and throat conditions, from orthopedic conditions and from general surgical conditions. The medical service is similarly divided into units caring for cardiovascular diseases, blood dyscrasias, diabetes, skin diseases and syphilis, etc. When indicated, a neurologic service for the care of nonpsychotic patients and a tumor service are established. All hospitals are staffed and equipped for the furnishing of dental treatment to hospitalized patients whose dental diseases are directly related to the condition requiring hospital care or originated in military service.

Special Clinics and Centers

The Veterans Administration has established in the proper geographic locations clinics and centers for diagnosis and treatment of diseases requiring specialistic services.

1. *Diagnostic Centers.*—These centers are established for the analysis of cases which are considered problems of diagnosis and in which the medical evidence is controversial as to the type and extent of disease and the disability arising therefrom.

The staff consists of full time physicians trained in various specialties and part time consultants whose professional background has been heretofore described. In most instances a complete social history is obtained before the patient is admitted. All medical data are made available in the case, and salient facts in the history and examinations are extracted. In some instances in the cases of World War I veterans medical history and reports of physical examination are available from 1917 to date of admission. Complete examinations by the full time and consultant staffs are made and appropriate reports dictated and assembled for final disposition. The patient is furnished such treatment as is required.

2. *Laboratory Centers (Clinical, Dental and Roentgen Ray).*—Clinical laboratory centers are utilized for the performance of other than routine laboratory tests and for the study of histologic slides by a full time consultant pathologist in the center. All consultation services are requested by trained pathologists located in other facilities.

Dental laboratory centers serve a large number of hospitals. The benefits that accrue from such services are numerous. Material and equipment may be used that are not practical in a small unit. This procedure results in an increased volume of better dental prosthetic appliances made by skilled workers at a lesser cost.

Roentgen ray laboratory centers receive films from other Veterans Ad-

ministration hospitals for review and interpretation. The full time consultant in roentgenology reviews the films and returns them to the sending hospital with a formal report.

3. *Chest Surgical Centers.*—Patients suffering from chest disease requiring surgical treatment may be referred to the chest surgical center. The procedure outlined is to furnish the center with a complete examination report, including laboratory data and films. The report and films are reviewed by a board, which determines whether it is advisable to transfer the patient for further examination. On the patient's arrival reexamination is made and surgical treatment instituted if advisable.

4. *Tumor Clinics.*—In order that all patients with tumor of malignant type may be intensively studied and uniformly treated with present day accepted methods of treatment, tumor clinics have been located in various sections of the country. Each clinic is equipped with the necessary radium and high voltage roentgen ray machines. Surgeons trained in the surgical treatment of tumorous conditions are available. Preliminary study and diagnosis may be made at a facility other than the one in which the tumor clinic is located. If it is determined that specialistic service is desired, the patient is referred to the tumor clinic. Complete history and examination are obtained and the case presented to the consultant and tumor board. Each member of the board personally examines the patient, and the board outlines the type of treatment to be instituted. After convalescence and dehospitalization, regular follow-up contacts are made with the patient. Reexamination and rehospitalization are effected if indicated. Statistics as to number, type and results of treatment are maintained.

5. *Research Centers.*—Centers for the study of cardiovascular disease, cancer and neuropsychiatric disease have been established.

Physical Therapy

In the planning and construction of new hospitals the physical therapy department receives the same consideration as to allocation of space as other departments. It is usually located in space convenient for both outpatient and inpatient departments. Each Veterans Administration hospital has a physical therapy department under the supervision of a physician and a chief technician. The request for the treatment originates with the ward surgeon, who initiates the clinical record form, giving the diagnosis, condition for which treatment is required and any other data indicated regarding the patient's physical condition. The part to be treated and type and duration of treatment are listed. The request is reviewed by the physician in charge of the department and referred to the chief technician, who prepares a master card listing treatment prescribed. The patient is given the card and referred to the proper technician for treatment. On completion of treatment the card is initialed by the technician giving the treatment and returned for filing in the active file located in the office of the chief technician. On each subsequent visit the patient receives the card from the chief technician and presents it to the technician for treatment. On completion of the treatment prescribed, or before if the physician chooses, an examination is made by the physician in charge of the physical therapy department. If it is determined that further treatment is not indicated, the original request, on which is listed all treatment given, is returned to the ward for filing with clinical records.

During the month of June 1943 approximately 259 physical therapy technicians were employed by the Veterans Administration and furnished treatment of 10,552 patients. Twenty per cent of the patients in tuberculosis hospitals received physical therapy; 15 per cent of the patients hospitalized in the neuropsychiatric hospitals received physical therapy, and 16 per cent

of the patients under general hospital or domiciliary care received this treatment.

Every type of physical therapy treatment is available to exservicemen and women in the Veterans Administration physical therapy departments, and preparation is being made for the younger, more active patients who will benefit by physical exercise. Because of the increasing age of those from World War I, the physical therapy treatments were gradually adjusted to meet their needs, and in recent years arthritic conditions and peripheral vascular diseases were studied and treated extensively, with encouraging results.

In addition to the usual program for the arthritic patient, the hospital at Bay Pines, Fla., has a beach house and wind breaker near the water, which make possible sun treatment and exercise both on the beach and in the water. Excellent results have been reported.

Because of the numbers suffering from peripheral vascular diseases, treatments for these conditions have received special attention, with good results, particularly when the treatment has been intensive and continuous. Treatment in this connection includes the proper balance between exercises, rest and special treatments with suction pressure, intermittent venous occlusion apparatus or the use of the oscillating bed. During June 1943 over 1,900 treatments with the suction pressure and intermittent venous occlusion units alone were reported for these conditions in the general medical hospitals.

In October 1942 the Veterans Administration opened one of the mineral baths at Saratoga Springs, N. Y., and the preliminary report indicates that both the arthritic patients and those with circulatory diseases selected for treatment will be benefited by the use of the waters available at that location.

Occupational Therapy

All tuberculosis and neuropsychiatric and many general medical facilities where there is a large group of patients with chronic diseases requiring long continued treatment are equipped for the furnishing of occupational therapy. The number and variety of projects depend on the type of hospital. The method of prescribing occupational therapy is similar to that used for physical therapy. Approximately 224 occupational therapy aides are employed by the Veterans Administration. During the month of June 1943, 11,085 veterans received occupational therapy under the immediate direction of the aides, and 16,364 veterans received occupational therapy under the general supervision of the aides.

Twenty-one per cent of the patients receiving hospital treatment for tuberculosis were given occupational therapy in textile craft, reed and cane, woodworking, leather and bookbinding.

Sixty-five per cent of patients receiving hospital care for neuropsychiatric diseases received occupational therapy in a variety of projects, such as textile crafts; reed and cane; woodworking; leather and bookbinding; making of pajamas, mattress covers, brooms and brushes; shoe repairs; printing; farming; gardening; music, etc.; 3,245 patients received habit training.

Ten per cent of the patients receiving hospital care for general medical and surgical conditions received occupational therapy in projects similar to those utilized for tuberculosis patients.

Relationship Between Hospitals of the Armed Forces and the Veterans Administration Facilities

When it is determined by the medical staff of the Army or Navy hospital that medical rehabilitation to a degree permitting the return of the soldier or sailor to active duty cannot be accomplished, and further hospitalization is

indicated, the patient is transferred to a veterans hospital. On arrival there he is discharged from the Army or Navy. The veteran's clinical records, or a résumé thereof, accompanies him at the time of admission to the Veterans Hospital. The veteran remains in the hospital until he has received maximum benefit from hospital care. During his period of hospitalization he may make application for compensation or pension, and his eligibility thereto is decided by the adjudicating agency. On the completion of hospitalization, if eligible he may make application for vocational training at government expense.

Conclusion

Many of the essential hospital services have not been discussed. Special studies are made in selected cases. Group studies by recognized specialists are made in cases presenting problems of diagnosis in medicine and surgery. There is no break in the continuity of treatment of veterans discharged from the hospitals of the armed forces. Medically rehabilitated veterans if eligible may be placed in vocational training at Veterans Administration expense.

ELECTRIC SHOCK THERAPY ITS INDICATIONS AND USE *

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and

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The purpose of this paper is to give a brief account of the technic and character of electric shock therapy as employed at the Mayo Clinic, with a consideration of some of the complications. In addition the indications and contraindications will be mentioned. The history of electric shock therapy has been well covered^{1,2} and need not be considered in this article.

Apparatus

The machine used to produce electric shock at the clinic was constructed under the direction of Dr. E. J. Baldes and Richard Jones, of the Division of Biophysics. It utilizes the ordinary 110 volt, 60 cycle, alternating current and includes two circuits, one for estimating the resistance of the patient to the alternating current and the other for delivering a calculated shock dose. The amperage can be varied from 250 to 700 milliamperes. The time element is governed by a roentgen ray timer graduated into intervals of 0.1 second from 0 to 1.0 second and into intervals of 0.25 second from 1.0 to 14 seconds. There are three dials: (1) for controlling the timer, (2) for controlling amperage and (3) for compensating for the resistance of the patient. Today several machines for electric shock therapy are produced commercially and are available if production has not been curtailed by the war.

* Read at the Twenty-Second Annual Session of the American Congress of Physical Therapy, Chicago, Sept. 10, 1943.

Technic of Treatment

All patients under treatment are hospitalized. They have undergone physical and neurologic examinations and routine laboratory tests. Special tests, such as examination by electroencephalograms and electrocardiograms, are performed when indicated. Breakfast is withheld, and it is usually better if the patient has not received any of the barbiturates the night before. The patient lies on the ordinary hospital bed with a firm pillow beneath the thoracic portion of the spinal column to maintain hyperextension. The electrodes are applied to the temples after brisk rubbing of the skin with acetone and application of electrode paste.

The resistance of the tissue is estimated for two reasons: (1) to insure good contact and (2) to insure delivery of enough current to produce a convulsion. When the resistance of the tissue has been reduced as low as possible (average 300 to 500 ohms), the machine is adjusted to compensate for this factor. The calculated dose of curare is injected; the technic of this procedure will be described a little later. As the patient becomes weak, usually in from one to three minutes, a final estimation of the resistance is made. A padded gag is placed in the patient's mouth and the shock dose of electricity is delivered. The usual dose varies between 300 and 600 milliamperes for 0.2 second. Loss of consciousness is immediate and is accompanied by a general muscular jerk. Following this, one of two things may happen. The patient may soon open his eyes in a confused manner, indicating that he has had a subconvulsive dose, a "petit mal" response. Should this happen, a second shock at a higher amperage may be given within a few minutes or treatment may be suspended for the day. If a sufficient dose has been given the jerk is followed, in a few seconds to one minute, by a typical grand mal convulsion lasting thirty to sixty seconds. At the end of the convulsion a brief period of apnea, followed by violent hyperpnea, may occur. The apnea rarely is prolonged enough to constitute a complication. After the hyperpneic phase, the patient may lapse into a stuporous sleep for a few minutes to half an hour. On recovery the patient is usually confused and amnesic for a variable period up to many hours. During the early period of confusion the patient may manifest exaggerated motor activity. This stage may prove distressing to those in attendance and constitute a potential danger to the patient. The distressing features of this phase are reduced by the use of curare.

The use of curare in shock therapy was introduced by Bennett and has proved a definite asset.³⁻⁵ The preparation* we have used is standardized so that 1 cc. contains 20 mg. of the active substance and will produce curarization of about 40 pounds (18.1 Kg.) of body weight. The calculated dose for the first treatment is reduced by 1 cc. to compensate for unexpected sensitivity on the part of the patient. The dose is injected intravenously in from one to one and a half minutes. Complete curarization is not necessary or even desirable. The muscles of the neck are affected first. When they have become so weak that the patient is unable to raise his head, sufficient protection has been gained. In event of overdosage or unusual sensitivity prostigmine should be injected intravenously as an antidote. Other substances, such as quinine methochloride,⁶ beta-erythroidine hydrochloride⁴ and magnesium sulfate,⁷ all of which have a curare-like action, have been suggested but we have had no personal experience with their use.

Electric shock treatment is given three times a week. As a rule six to ten treatments are sufficient. If no improvement has occurred at the end of this time, it is doubtful whether further treatment will be beneficial. Kalinowsky and Worthing,⁸ however, urged that at least twenty treatments be given to

* The preparation we have used is intocostin prepared by E. R. Squibb & Sons.

schizophrenic patients. It is usually well to give two or three treatments after improvement begins in order to forestall a relapse. If relapses occur, they should be treated as soon as they become obvious. An abortive shock does not constitute satisfactory treatment.⁹⁻¹⁰

Complications

The most common serious complication of shock therapy is skeletal injury. Fractures are significantly less frequent as a result of electric shock than as a result of metrazol therapy.¹¹⁻¹²⁻¹³ This may be due to two factors: a less severe convulsion after electric shock and a better understanding of the prevention of fractures gained from experience with metrazol. Injuries consist primarily of compression of one or more thoracic vertebrae with occasional fractures of the long bones. By hyperextension of the thoracic portion of the spinal column and use of partial restraint and of curare, most of these injuries can be avoided. Occasionally dislocation of the jaw may occur during the first portion of the convulsion, but this may be prevented by pressure upward on the chin. Electric shock is more likely to cause prolonged apnea after a convulsion than is metrazol. This tendency is exaggerated slightly by curare. The patient is safeguarded by the prompt use of prostigmine and artificial respiration when necessary.¹⁴ Loss of memory and confusion always occur for a variable period after treatment but may be prolonged for several months.¹⁵ Structural changes in the brain attributable to the convulsions have been noted in experimental animals¹⁶ and human beings¹⁷⁻¹⁸ after electric shock therapy. The exact significance of these changes is not known.

Indications and Contraindications

The indications for electric shock therapy are best understood by considering the conditions which respond favorably to such treatment. It is generally agreed that affective reactions (depressions) respond best. Manic excitements are favorably influenced, but the results are less dramatic. Among schizophrenic patients the results compare favorably with those obtained from shock produced by metrazol. Of the classic types of schizophrenia, the catatonic type derives the most benefit and the other types much less benefit.¹⁹⁻²⁵ Excitements due to organic brain disease are often alleviated so that other means of therapy are made possible. Some advantages of electric shock therapy as contrasted with other types of shock therapy are (1) less discomfort and fear because of the immediate loss of consciousness, (2) fewer serious complications, (3) greater ease of administration and (4) greater willingness of the patients to cooperate because of the other advantages listed.

Contraindications have been listed as cerebral lesions, tuberculosis, advanced heart disease, disease of bone (except osteoarthritis), malignant tumors, inanition, thrombophlebitis and glaucoma.²⁰⁻²⁵ That these contraindications should not be considered absolute is indicated by the paper of Evans²⁶ and the observations of others.¹⁶⁻²⁷⁻²⁸ The danger from exaggeration of preexisting physical disabilities or production of new ones must be balanced against the severity of the psychosis and its possible evil effects.

Comment

In conclusion it is of interest to consider briefly the rationale of shock therapy. Various explanations have been offered, but none seem entirely adequate. They may be classed under two headings, biochemical and psychologic. Some biochemical explanations have to do with the dispelling of accumulated toxins, augmentation or diminution of metabolism of the brain and increase in permeability of cell surface films.²⁹ The psychologic explanations have a more dramatic quality and include the ideas that the shock represents a punishment,

a death and rebirth;²⁰ a threat to existence with repression of conflicts,³⁰ or a dissipation of self-directed destructive energy by the convulsive movements.³¹ Whatever the rationale, it is well to remember that shock therapy should not be looked on as the sole means of treatment but as an extremely valuable adjunct to the usual psychotherapeutic methods.

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RENAL COMPLICATIONS OF COMBINED SULFATHIAZOLE- FEVER THERAPY *

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The most dangerous side reaction of the sulfonamide compounds is admittedly the renal complications. Cases of renal colic, hematuria and fatal anuria are being described with increasing frequency.^{1, 2, 3, 4}

Reports on the occurrence of toxic manifestations of the sulfonamide compounds in connection with artificial fever therapy are rare. Kendall, Simpson and Rose⁵ said that elevated temperatures exaggerated the tendency of these drugs to produce dizziness, headache, mental confusion and delirium. Peterson and Beuchat⁶ treated 81 patients with resistant gonorrhea with fever therapy and concluded that previous medication with sulfonamide drugs rendered fever therapy more difficult to administer and more dangerous to the patient. They stated that the complications of fever therapy are at least five times more frequent in those who have had such drugs than in those who have not had them. They attributed the appearance of cerebral edema during the fever session to the sulfonamide compounds but made no mention of renal symptoms.

In a series of 250 soldiers treated with artificial fever and concurrent sulfathiazole therapy at Stark General Hospital, only 3 had transitory renal damage.

At Stark Hospital, in the genitourinary section one third of all patients with gonorrhea given sulfathiazole alone showed sulfa crystalluria. Evidence of mild renal damage manifested by renal colic and/or hematuria occurred in at least 1 per cent of these patients. The incidence of renal complications in the fever therapy section with the combined treatment was similar to that with sulfathiazole alone in the genitourinary wards.

The prefever preparation includes a careful history, a complete physical examination and all indicated laboratory studies. Special attention is paid to the genitourinary status, and station hospital charts are searched for the appearance of toxic symptoms during the previous administration of sulfonamide drugs.

Laboratory studies include phenolsulfonphthalein excretion tests; determination of the blood levels of nonprotein nitrogen, total chlorides and sugars; urethral smears, and prostatic cultures. Determinations of the sulfathiazole level of the blood are not routinely done because they are not dependable. The routine urine examination is considered the most important single laboratory procedure, and a careful search is made for blood, albumin and sulfa crystals. The presence of occasional crystals alone is not a contraindication for combined treatment. A urine loaded with sulfa crystals indicates the need for intravenous in addition to oral administration of fluids to

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⁵ Read at the Twenty-Second Annual Session of the American Congress of Physical Therapy, Chicago, Sept. 8, 1943.

assure an adequate urinary output. If with a previous course of sulfonamide medication evidence of renal irritation has appeared, i. e., there have been erythrocytes in the urine associated with albuminuria or crystalluria, combined fever therapy is at present contraindicated.

In a group of 3 patients, not included in this series, who presented evidence of renal symptoms during previous sulfonamide medication, fever therapy alone proved effective and no renal complications appeared. Another patient, with a history of renal colic following sulfadiazine medication, was treated with combined sulfadiazine-fever therapy, and no renal complication appeared.

A routine dose of 12.5 Gm. of sulfathiazole with sodium bicarbonate gram for gram was administered in divided doses in the forty-eight hour period prior to the fever session to 200 patients, whereas a 9 Gm. total dose over an eighteen hour period was administered to our last 50 patients in compliance with instructions from the office of the Surgeon General.⁷

Eight hours of fever at a temperature level of 106 to 106.7 F. induced in ninety minutes has proved an effective dose. To secure a positive water balance prior to the fever session and to maintain an adequate urinary output during the chemotherapeutic phase, 6 liters of fluid per day is forced for two days before treatment. An average of between 4 and 5 liters is given during the session, and 2 liters is administered in the first six hours after the fever therapy is given. The fluid intake and urinary output are carefully charted.

Rosenberg and Epstein⁸ stated that the average loss of sodium chloride in perspiration is approximately 25 Gm. during the fever treatment. They advised against the oral use of salt in tablet or solution because of its irritant effect on the gastrointestinal mucosa. We, too, have observed this effect, but we have found that sodium chloride administered in 10 grain gelatin capsules in amounts of 8 to 12 Gm. is readily taken by the patient during the fever session. In the last four months, since the administration of salt in capsules was instituted, only about 1 patient in 20 has complained of gastric irritation. The incidence of nausea and vomiting has decreased remarkably.

Winsor and Burch³ have pointed out that a dehydrated patient receiving sulfathiazole medication is more likely to experience renal damage because little urine is excreted. To insure an adequate urinary excretion during the fever session, the intravenous administration of 1 to 2 liters of physiologic solution of sodium chloride with 5 per cent dextrose in addition to oral administration of fluids was employed. This invariably increased the urinary output and in many instances doubled it. Therefore, one would logically assume that intravenous administration of fluid would be an excellent procedure for patients who do not take adequate fluids and show a poor urinary output during the fever therapy session.

Report of Cases

CASE 1.—Private J. L. M., a 23 year old white soldier, was transferred to Stark General Hospital for fever therapy after three courses of sulfathiazole had been administered at a station hospital for chronic gonorrhea with no appreciable improvement. In none of the three courses had hematuria developed. He had a profuse urethral discharge associated with slight dysuria. The prostate was enlarged and indurated. The urethral smear was positive for gonococci. It was intended that he receive but four hours of therapeutic fever of between 106 and 106.7 F. The usual prefever routine was carefully observed, and no abnormality was found on examination of the blood or urine the morning before fever therapy was given. Phenolsulfonphthalein excretion was normal. During the session the patient took fluids readily (a total of 4,000 c.c.) but vomited repeatedly, emesis totaling 1,275 cc. Three hours after the patient was returned to the ward severe hematuria appeared. (The erythrocyte count fell from 5,000,000 to 4,000,000 and the hemoglobin content from 90 to 75 per cent.) Three hours after intravenous administration of 2,000 cc. of

5 per cent dextrose in physiologic solution of sodium chloride, the gross hematuria subsided. At this time the urine examination revealed innumerable erythrocytes, a 1+ reaction for albumin and many sulfa crystals. The urinary output remained adequate, and the microscope hematuria had subsided by the fifth day. The patient was subsequently returned to duty, cured of his gonorrhea.

CASE 2.—Private H. S. C., a 21 year old white soldier, was admitted for fever therapy for sulfonamide-resistant gonorrhea. He had had no hematuria with four previous courses. Except for anterior urethritis, with both smears and cultures positive for gonococci, the physical examination gave negative results.

An eight hour fever session was administered. The oral intake of fluid during the session was 4,485 cc., but the patient voided only 210 cc. during the maintenance phase. Twelve hours after the fever session a moderate hematuria appeared. Physiologic solution of sodium chloride, 2,000 cc., was administered, and the gross hematuria subsided in seven hours. The patient remained symptom free and was returned to duty cured of his gonorrhea.

CASE 3.—Private T. S., a 22 year old white soldier with acute gonorrhea, was admitted for fever therapy after three courses of sulfathiazole had proved ineffective. He had had no renal colic in any of the three previous courses. Anterior urethritis with urethral discharge was the only pathologic finding on physical examination. The urethral smear was positive for gonococci.

Three hours after induction of fever the patient suddenly complained of pain in the right flank radiating into the right groin. He became extremely restless, thrashing about in the cabinet. The session was interrupted at once and the patient's temperature was reduced to normal. Physical examination revealed tenderness to percussion over the right costovertebral angle. The diagnosis of renal colic was confirmed by the urologic consultant.

Intravenous administration of 2,000 cc. of physiologic solution of sodium chloride and sedation readily controlled the symptoms. Examination of the urine revealed a sediment loaded with sulfathiazole crystals but no red blood cells. The patient remained symptom free. Three subsequent smears and cultures were negative.

Comment

The statement has been made by Peterson and Beuchat⁶ that the complications of fever therapy occurring in patients who have had previous medication with sulfonamide compounds are dangerous and at least five times as frequent.

The increased incidence of complications in their series cannot justly be compared to the incidence of complications which appeared in our series, because their therapeutic procedures did not follow our present accepted lines of therapy. The interval between the discontinuation of chemotherapy and the institution of fever therapy is not made clear by them. A further review of their paper reveals that prophylactic measures currently available were not completely utilized. For example, Peterson and Beuchat used oxygen only as an emergency measure for the treatment of their chief complication, cerebral edema, which they attributed to the sulfonamide compounds.

Cullen, Weir and Cook⁹ have shown prophylactic oxygen therapy given throughout the fever session reduces the incidence of restlessness, mental confusion and excitement. We have confirmed their work. Sixty-two of our patients were given oxygen intermittently with the Boothby-Lovelace-Bulbular mask for fifteen to thirty minutes each hour, and 62 were given oxygen continuously by nasal catheter throughout the induction, maintenance and reduction phase. In the first group 28 patients (45 per cent) were completely free of cerebral symptoms during the fever treatment, whereas in the second group 46 patients (74 per cent) exhibited no cerebral symptoms in spite of concomitant therapy with sulfonamide compounds.

The proper administration of fluids, the maintenance of the electrolyte balance, the continuous administration of oxygen, the addition of alkalis and the ability of the physician to recognize the early signs of renal difficulties

by careful and repeated urinary check have so reduced the incidence of all complications in combined therapy that the conclusions of Peterson and Beuchat are no longer tenable.

Summary

In a series of 250 patients treated with combined sulfathiazole-fever therapy, 3 had renal complications.

The danger of renal complications is no greater with combined sulfathiazole-fever therapy than with sulfathiazole therapy alone.

It is important to maintain an adequate fluid balance during all phases of therapy as a prophylactic measure.

If the urine shows erythrocytes, albumin and sulfa crystals during the administration of sulfathiazole, combined fever therapy is contraindicated.

The statement made by Peterson and Beuchat that fever therapy following medication with sulfonamide compounds is dangerous and increases the complications, especially cerebral edema, 5 to 1 was not confirmed.

Conclusion

The combination of sulfathiazole and artificial fever therapy is relatively innocuous provided proper precautions are taken.

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PHYSICAL THERAPY IN PERIPHERAL NERVE INJURIES *

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Injuries to peripheral nerves in civil life are so infrequent, according to Pollock,¹ that no one individual has been able to gather enough personal material to make a profitable clinical investigation. Most of our present-day clinical routine in treating these cases dates back to World War I, and it must also serve as a basis for taking care of the casualties of the present war. Tables 1 and 2 show the percentage of peripheral nerve injuries and the order of their frequency in World War I:

TABLE 1.—*Peripheral Nerve Injuries in World War I.*

	Percentage of Total Casualties	Percentage of Traumatism to Extremities
American Base Hospitals.....	4.5	14-16
French.....		18
German.....	1.5-2	

TABLE 2.—*Order of Frequencies of Peripheral Nerve Injuries in World War I.***

	U. S. Army	German Army
Total number	2,347	3,963
Ulnar	569	742
Musculospiral	529	936
Median	433	800
Sciatic	349	523
External popliteal	283	
Peroneal		183
Tibial		112
Brachial plexus	147	
Axillary		82
Musculocutaneous		71

These figures demonstrate that nerve injuries occur far more commonly in the upper extremity and that those of the musculospiral, ulnar, and median nerves are of major significance. Pollock states that of combination injuries those of median and ulnar nerves are the most common, while the radial and ulnar nerves are seldom injured in a combined lesion.

The author's experience in treating nerve injuries is chiefly derived from his early work at the Reconstruction Hospital following World War I. In three successive years the number of peripheral nerve injuries seen there was as follows: 119 in 1921, 90 in 1922, and 60 in 1923. In contrast, the average yearly number of cases seen in the recent fifteen-year period at the New York Polyclinic Hospital was from 30 to 40.

Changes Following Nerve Injury

Traumatization of one or more nerves may be caused by a projectile, cut, blow, wrench, gradual compression, friction, or stretching; it may consist of a bruise, laceration, or complete severance; it may occur at the time of the original injury or several hours, weeks, or months after this injury. The microscopic changes and the coincident or subsequent syndromes will vary according to the extent of the trauma and its circumstances.

There are immediate or gradual loss of function in the affected parts,

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** American figures relate to cases present in U. S. General Hospital No. 10, on May 1, 1919.² German figures were taken from Foerster's report.³

sensory changes, and typical posture. Histologically, in the distal part of the injured nerve, total or partial degeneration of the axis cylinder and muscle sheath occurs, while the affected muscle first shows fibrillation. Later its fibers become pale, shrink in size, and, if unsupported, stretch indefinitely. Coincidentally, typical changes in the electric excitability of the nerves and muscles occur, and there are also characteristic chemical changes in the muscles. Subsequently, the other soft parts, joints, bones, and tendons suffer from lack of nutrition and may develop adhesions, faulty positions, trophic ulcers, and other pathologic conditions. In certain partial and irritative lesions, dense fibrosis and muscle spasm develop. In neglected cases the muscles ultimately degenerate into fibrous tissue and fat.

Nerve Regeneration and Operative Treatment

In every nerve injury there is a spontaneous tendency for recovery by down-growth of axons from the central end of the nerve as long as the two ends remain in close approximation. The rate of growth of the axis cylinder is estimated to be 1 to 2 mm. per day. It varies in different nerves and, according to Tinel,⁴ it is greatest in the radial, musculocutaneous, and external popliteal, while in the median and ulnar it is often slow and incomplete. Pollock states that if there is no evidence of regeneration from four to five months after complete paralysis of the radial and peroneal nerves, surgical exploration should be performed, while in case of complete paralysis of the ulnar nerve the fifth month may be considered the maximum time to wait for recovery.

There is no electrical or other test available which will ascertain whether or not there is a separation of nerve fibers to such an extent that spontaneous regrowth is possible. In case of penetrating injuries the surgeon must decide on purely anatomic considerations whether to make an immediate nerve suture or not. Even immediate nerve suture, however, does not prevent subsequent nerve degeneration. In the majority of suspected incomplete nerve lacerations the tendency now is to wait and to make an exploratory operation only if (1) there is total loss of function for two months or more in an area exclusively supplied by a nerve, or (2) if recovery is extremely slow or there is a relapse, or (3) if there is a palpable neuroma at the site of the injury of a nerve, the function of which is seriously disturbed, or (4) if there is severe, persistent, and intractable pain.

Neurosurgeons emphasize the fact that while operative procedures in nerve injury make it possible for nerves to regenerate, they will not serve to restore function. It is conceivable that perfect regeneration might occur in the nerve and yet an extremity be functionless because of interphalangeal fibrosis, retraction of capsular ligaments, marked atrophy and fibrosis, shortening of muscles, spasms of muscles, and ankylosed joints. This explains the importance of the early institution and systematic application in all nerve injuries of such measures which will tend to maintain nutrition and function in the affected parts.

Role of Physical Therapy

All surgeons who have treated large numbers of nerve injuries emphasize the fact that physical treatment is of immense value in both non-operative and postoperative treatment.¹⁻⁵⁻⁶ Electrical testing is indispensable as an adjunct to diagnosis and follow-up of nerve injuries, with the large variety of physical treatment measures serving to stimulate circulation, maintain nutrition, conserve the function of muscles, prevent their overstretching, prevent adhesions and deformity from shortening of muscles, ankylosis of

joints, and in the later stages to re-educate muscle function. The anatomic regeneration of the nerve itself can be assisted only indirectly by improvement of the circulation and nutrition.

The official *U. S. Army Report on Physical Reconstruction*,² issued at the end of World War I, outlines the duties of the physical therapy department in cases of nerve injuries as follows: "In the physiotherapy treatment of nerve injury cases it is essential that the director of physiotherapy make a clinical examination, together with a brief history. The following notations should be included on a suitable clinical record form: cause and date of injury; date of healing of wound; time of appearance of paralysis in relation to injury; treatment up to present time, including surgical measures; muscle groups paralyzed; area of sensory impairment; degree of atrophy; extent of fibrosis; presence of trophic ulcers; vasomotor changes and neuromata; formation on the 'D. T. P.' (distal tingling on percussion); measurement of girth of affected limb as compared with the opposite or normal limb, and measurements with suitable protractors of any limitation of joint mobility, if such is present. The electrical reactions should be taken, following which the specific treatment should be outlined, with proper instructions to the aide to whom the case is referred. A report is then sent to the surgeon of the findings of the electrical reactions, stating in terms of pathology the condition of the nerve as interpreted from the reactions, and the outline of treatment which the patient will receive. A monthly progress note and report to the surgeon is in order, with special reference to any material changes in electrical reactions, return of sensory or motor functions, progressive advancement of the D. T. P., and the like. The practice of personal consultations with the surgeon who has charge of the patient can well be emphasized."

Electrodiagnosis

The basic change in electrical reactions in the case of full paralysis is the typical R. D., or reaction of degeneration. The injured nerve does not respond to any form of electrical stimulation, while the affected muscles, because of the gradual process of degenerative change in their substance, cease to respond after the eighth day to a short electric stimulus (as furnished by the faradic current) but continue to respond, although sluggishly, to the longer stimulus of the make and break of a galvanic current. The occurrence of the reaction of degeneration signifies a separation—*anatomic or physiologic*—between a muscle and its trophic center and, therefore, may mean any of the following: complete section of the nerve, compression due to callus, degeneration of nerve after interstitial sclerosis (neuroma, hypertrophic interstitial neuritis), abolition of function of the trophic center in the spinal cord due to a lesion in the anterior horns (poliomyelitis, syringomyelia, etc.) or, finally, alteration of the peripheral nerve endings owing to toxic lesions. The presence of R. D. serves as an important guide in diagnosis and prognosis in diseases or injuries of the peripheral nerves, but it cannot determine whether the nerve has been divided or not, as already stated. On the other hand, since functional, hysterical paralyses and paralyses of cerebral origin are never accompanied by important disturbances of the electrical reactions, the absence of R. D. serves as important evidence in determining malingering or functional paralysis and in differentiating them from other conditions. "Absolute" reaction of degeneration, consisting of total lack of response of the nerve or muscle to any electric stimulation, implies that the continuity of the nerve has been completely destroyed and that muscle tissue has been replaced by fibrous and fatty tissue. Prognosis for recovery is hopeless in these cases.

The classical faradic-galvanic test serves, however, only as a qualitative test. For measurement of the strength of current needed for stimulation, and for more exact prognosis and follow-up charting, the newer methods of condenser testing and chronaxie measurement furnish very desirable means. Testing by *condenser discharges* is based on the fact that the discharge of a condenser through a constant resistance varies in duration according to the capacity of the condenser. With a set of condensers of various capacities it is possible to obtain currents whose total duration varies from 1/24,000 to 1/200 second. Instead of a long description of the type of response, a simple numerical equation (from 0.01 to 10 microfarads) is available and serves as a basis of comparative charting. In *chronaxie* testing, a current intensity of a known contractile effect upon an individual muscle or nerve is applied. The difference in time necessary to get a contraction is the only variable factor, and this can be accurately observed and recorded. The unit of measurement is the sigma, representing 1/1,000 of a second, and the results are recorded in decimal figures as in condenser testing. The application of these refined tests requires, on the other hand, special equipment, well-grounded technic and a great deal of time; hence for quick determination of the state of nerves and muscles, the classical faradic-galvanic method serves still as the simplest aid to the initial clinical examination.

Physical Treatment Measures

For physical treatment of nerve injuries a fairly large variety of treatment measures is available. However, their skillful employment requires painstaking institutional care or a well-equipped specialist's office. Nerve injuries as a rule cannot be treated either safely or efficiently in the office of the average general practitioner. Table 3 shows the variety of physical treatment measures and their object.

TABLE 3. — *Physical Treatment Measures in Nerve Injuries.*

Form	Object	Period of Use
Splinting	Prevention of deformity	From beginning
Heating	Improvement of circulation and nutrition	From beginning
Electric muscle stimulation	Preserve functional capacity of muscles	From beginning
Passive movement	Prevent fibrosis and contractures	From beginning
Massage	Aid circulation, improve nutrition	From beginning
Active exercise	Re-education of muscle function	In later period
Occupational therapy	Hasten muscular recovery	In later period

Splinting. — Splinting is a measure of primary importance for maintaining the condition of paralyzed muscles and assuring a position of anatomic rest and complete relaxation of all paralyzed muscles. It will also prevent shortening of their antagonists. Splinting must be maintained until signs of voluntary motion appear, but it should not be kept up indefinitely, as prolonged immobilization in itself will cause periarticular joint changes and muscle atrophy. Many patients have been incapacitated by the fibrosis which has resulted from the prolonged and uninterrupted use of splints. Splints must be simple, light, easily applied, and easily removed.

Thermal Measures. — The object of thermal measures is to improve nutrition and relax muscles and prepare the limb for further treatment. The most convenient and safest measure for this purpose is the hot whirlpool bath, at a temperature of 100 to 105 F., in which the affected extremity should be submerged for at least half an hour. It combines sustained heat with gentle friction and under this combined action the previously cold, clammy, and often tender limb becomes warm, red, and painless. When the whirl-

pool bath is not available, a heat lamp or a nonluminous infrared generator may be applied for half an hour, at a distance of comfortable toleration. Because of the frequent prevalence of disturbed sensation, impaired circulation, and other trophic changes, all heat measures must be applied very cautiously in order to avoid the production of slowly healing burns. For the same reason the use of diathermy in these cases should be reserved for expert hands. It has been argued that diathermy exerts a more efficient heating effect in extensive muscle atrophy and that in early cases it may retard or arrest muscle fibrillation which, according to Langley,⁷ always follows severance of the nerve and is the cause of muscle atrophy. Short wave diathermy is best applied with the inductance cable wound around the extremity and kept up for thirty minutes at a rate of moderate heating. Any method of heat treatment should be applied systematically, preferably daily, to accomplish the best results.

Electric Stimulation. — Electric muscle stimulation of the paralyzed muscles is an important standard measure of early physical treatment. Its rationale and the form of current most suitable have been subject to much controversy. When muscles are fully paralyzed and are unable to do any active work, it would seem evident that a method which enables muscles to maintain part of their contractility and their nutrition is a desirable one. Electrical stimulation is the only known means for this purpose and its value is being attested by both clinical and experimental evidence. A recent editorial in the *Journal of the American Medical Association*⁸ recalls that the earliest experimental work to prove the importance of electric stimulation in maintaining the nutrition of a muscle deprived of its nervous influence was performed over a hundred years ago, in 1841, by John Reid,⁹ a young lecturer on physiology at the University of Edinburgh. The original object of his investigation was to settle the controversy over whether the property of muscle contractility is inherent in the muscle itself or is derived from the nervous system. In these experiments, the spinal nerves were cut across on four frogs, and the muscles of one of the paralyzed limbs were daily exercised by a weak galvanic battery, while the muscles of the other limb were allowed to remain quiescent. This was continued for two months, and at the end of that time the muscles of the exercised limb retained their original size and firmness and contracted vigorously, but those of the quiescent limb had shrunk to at least one-half of their former bulk and presented a marked contrast with those of the exercised limb.

Clinical experience in the treatment of the large number of cases of the war injured has amply established the value of electric muscle stimulation in peripheral paralysis. Pollock¹ states: "Electrotherapy serves to conserve vitality, prevent complete atonia, and increase the contractility of paralyzed muscles." Souttar and Twining⁵ state: "Were we limited in the treatment of peripheral nerve injuries to one method of treatment and had nothing but the muscle to consider we should ourselves prefer electrical stimulation to all other methods." On the other hand, some orthopaedic specialists doubt any value of electrical muscle stimulation in paralysis and strongly voice their conviction that voluntary muscle exercise is the most desirable form of activity and no other form of exercise can have the same physiologic value. Experimental evidence is being cited that electrical stimulation cannot retard atrophy and degeneration of denervated muscle and the degree of regeneration of the peripheral nerve is not influenced by physical measures (Chor *et al.*¹⁰). Tower¹¹ maintains that because the atrophy of denervated muscles is due to a continuous fibrillation, leading to exhaustion of the muscle, electric stimulation does not appear rational.

In confutation of such doubts, very recent experimental work has again corroborated the classical observations of Reid. Fischer¹² has shown that the suitable type of stimulation is effective in increasing the size of muscle fibers and their metabolic capacity; Gutmann and Guttmann¹³ have demonstrated that electric stimulation accelerates the return of the muscle to its initial volume after reinnervation and possibly prevents atrophy, while Liebesny¹⁴ proved that such stimulation can produce response even in a completely fatigued muscle. Finally, Hines¹⁵ concluded that electrical stimulation to the point of overstretching and even local fatigue does not appear to be detrimental to any phase of neuromuscular regeneration. Thus, on the basis of extended clinical employment as well as on seasoned experimental evidence, the case still stands for the judicious employment of electric stimulation in peripheral paralysis as part of a well-rounded routine of physical treatment. In addition to the actual physiologic effect, the influence of systematic electric treatments on the morale of the patient must also be considered.

There is some controversy also concerning the most desirable form of electric stimulation and its extent. Since fully paralyzed muscles do not respond to the short impulse of a faradic current, this current is of no value in these cases. Active stimulation can be produced by the slow (galvanic) sinusoidal current. This consists of a slow surge of a galvanic current in one direction, followed by a similar one of the opposite polarity. Because of its effectiveness and relative painlessness, many clinicians, including the author,¹⁶ prefer the slow sinusoidal current. Others, including Pollock, consider the make and break of the ordinary galvanic current (interrupted galvanism), although it is more painful and abrupt, just as effective. In recent years stimulation by a series of condenser discharges has been extolled abroad because of the possibility of affecting selectively the paralyzed muscles and leaving the normal ones unaffected (Turrell¹⁷). These observations have been corroborated here by Liebesny.¹⁴

In proceeding with the technic of electric stimulation, the first step is to warm the area of the paralyzed muscles to be treated. The muscles must be placed in a relaxed and supported position where they do not have to contract against gravity. The usual technic employs individual muscle stimulation, using a small disk electrode over or near the motor point—which is usually displaced distally—and a large dispersive electrode in a suitable location. In very weak muscles the bipolar method may be employed first, with two disk electrodes over either end of the muscle belly. This prevents spreading of the strong current to neighboring normal muscles and the misleading effect of such response. No vigorous contractions are to be elicited at any time, for paralyzed muscles may get quickly exhausted. Harpuder¹⁸ points out that as abnormal fatigability of the motor synapse and lack of energy material in the muscle are physiologically characteristic of denervation, strong stimulation of long duration requires caution. One should begin in early cases with two or three contractions daily to each muscle and gradually increase this number to thirty or forty per session. After many weeks or months of systematic daily stimulation there comes the first indication of the return of voluntary motion in one or more of the paralyzed muscles. This is proof that the nerve trunk and the motor endplate have regenerated. Response to the faradic current returns about this time or, as a rule, somewhat later. One must be careful not to replace the slow sinusoidal too quickly by the surging faradic current, for recovering muscles are sensitive toward more exhausting exercise and may be easily tired out.

Massage. — Massage as an aid to circulation and for the improvement of nutrition is a useful part of the routine physical treatment. So far as the prevention of muscle atrophy is concerned, massage is only of slight benefit. As a matter of fact, according to Mennell,¹⁰ heavy massage is transmitted to the blood vessels and may cause paralytic dilatation. Massage should be always preceded by a thermal measure and administered to the well-supported and completely relaxed extremity. It should begin with rhythmic superficial stroking and continue with gentle kneading of the skin and of any contracted muscles, with friction over ankylosed joints. The average massage treatment should take from ten to twenty minutes.

Passive Movement. — Suitable manipulation of joints and stretching of muscles in peripheral nerve injuries is of even greater importance than routine massage; however, it is best carried on in conjunction with massage. Contractures and adhesion of joints, muscles, and tendons are due to shrinkage of newly formed connective tissue. Introductory heating and massage tend to soften this tissue and to promote its absorption, while gentle manipulation serves to stretch it and slowly free it. Such manipulation will also enable normal joints to keep active and increase the range of motion in those which already have become impaired. In manipulating a joint it is better to increase the movements which are not so much limited, and in the course of their restoration to normal, gradually to limber up the most obviously limited movements. The latter are resisted by the strongest adhesions. There is no reason for stretching under anesthesia in these cases because this is likely to cause considerable damage to the capsule and the periarticular tissues. Early and skillful employment of suitable passive movements and manipulation is the best preventative of the formidable ankylosis and contractures. In order to make possible this early treatment, splints must be removable, and in case of nerve suture passive movement should be instituted as soon as the condition of the scar permits—usually after two weeks.

Active Exercise. — Active exercise and re-education of muscle function comprise the most important part of the treatment after active power to the affected muscles has begun to return. This occurs, as a rule, not earlier than the fourth month after injury. However, a nerve injury causes loss of function of an extremity far beyond the structures that are actually involved, because the normal use of the extremity has been lost. Furthermore, the usual routine of splinting and immobilization tends to cause patients to restrict the use of the limb to a minimum. The early use of suitable exercises will reduce much of the unnecessary waste of muscles and stiffening of joints. Hence, even in the early treatment of nerve injuries, exercises are indicated for maintaining the function of muscles not directly affected and also for maintaining the full range of joint motion. When signs of active power appear in the affected muscles, the simplest possible active exercises with these muscles are begun, at first with as much assistance by the technician, as required. Movements on a powdered board or under water will greatly aid in overcoming gravity and in allowing gradual redevelopment of function in the very weak muscles. Exercises must be carried on in all instances with the parts properly supported and previously warmed. It is very rarely necessary to use artificial exercise apparatus for this purpose, but use can be made of the various types of simple active exercise devices that are available. Overexercising must be avoided at all times.

Occupational Therapy. — The last stage of muscle re-education consists in active stimulation of the patient's efforts by occupational therapy. A well-equipped and supervised work shop, where various simple tools provide

practical and attractive work, is most desirable for this purpose. The same setup can be used in cases where there is lack of recovery, to teach the injured to make the best use of what remains to him. Gymnastic exercises are also valuable in this stage for general muscle redevelopment and increase of coordination.

Summary

1. The importance of the proper diagnosis and care of peripheral nerve injuries is shown by the fact that their number in World War I amounted to 5 per cent of the total casualties and to almost one-fifth of all traumatism to the extremities.

2. Operative procedures in nerve injury make it possible for nerves to regenerate, but they will not serve to restore function. As long as there is end-to-end apposition of nerve endings, there is a spontaneous tendency for recovery in nerve injuries.

3. In all nerve injuries early institution and systematic, skillful application of physical measures are essential for maintaining nutrition and function in all affected parts. These measures comprise, in early stages, splinting, thermal measures, electric muscle stimulation, massage, and passive movements; in the later stages, active exercise and occupational therapy.

4. Electrodiagnosis furnishes an indispensable aid in the diagnosis and recording of progress in nerve injuries and in differentiation of malingering or functional paralysis.

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REHABILITATION IN CASES OF ARTHROGRYPOSIS MULTIPLEX CONGENITA *

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Arthrogryposis multiplex congenita, although a relatively rare medical entity, is peculiarly a fitting subject for this symposium on rehabilitation of children. The multiplicity of deformities and the apparent hopeless crippling challenges our efforts at rehabilitation.

I have been greatly interested in these embryonic malformations since Stern in 1923 first recognized that they were not haphazard multiple deformities accidentally occurring in a single unfortunate person but, rather, were characteristic deformities occurring with such similarity in case after case that as a group they formed a definite "medical entity," or a clinical syndrome, which he entitled arthrogryposis multiplex congenita. This truth once recognized has since been verified by many observers.

Middleton in 1934 thought there was a distinct similarity between the multiple stiff joints noted in arthrogryposis multiplex congenita and the rigidity of limbs found in newborn lambs described by Fraser Roberts. The rigidity he believed resulted from a primary muscular pathologic change which resembled a myodystrophy occurring in fetal life. He thought the muscle embryonic origin had developed but that after differentiation into muscle tissue, fatty degeneration and fibrosis of muscle fibers occurred, producing pathologic changes analogous to the muscular dystrophies seen in children. He therefore used the term myodystrophy feotalis as a more descriptive name for this entity.

Stern has excellently described the characteristic features of arthrogryposis multiplex congenita. There has been offered, however, no explanation for the development of the malformations other than the repeated suggestion that malposition of the extremities in utero probably was the cause. Sheldon did postulate that in the growing limb bud of the fetus, if the muscles were so affected that motion of joints did not occur, the differentiation of joint structures might be incomplete.

For years I have been studying the embryonic development of the limbs and their development into maturity in the search for a possible explanation of several clinical lesions such as sciatica, clubfoot and congenital dislocation of the hip. It seemed reasonable to suppose that the pathogenesis of the characteristic deformities of arthrogryposis multiplex congenita, which are true embryonic malformations, might be explained by arrest of normal embryonic development.

Pathogenesis of the Embryonic Deformities

Analysis of the complicated deformities in the typical case of arthrogryposis multiplex congenita shows that there are essentially four main features, which may be classified for descriptive purposes to explain the deformities of this syndrome.

1. *Joint Rigidity.*—Rigidity of many joints, particularly with the knees fixed in extension or hyperextension, the elbows held in a partial extension of 140 degree attitude, with rigidity of wrist joints and ankle and foot. The

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rigidity is of a varying degree, incomplete without evidence of structural malformation or maldevelopment of the architecture of the joints except in dislocation of the hip.

2. *Congenital Deformities.*—Club feet and club hands are frequent deformities associated with this syndrome. There is a characteristic appearance to the clubbing of the hands and feet which is somewhat different than the usual congenital deformity. The marked stiffness of the joints, the involvement of the fingers and tarsal joints and the marked resistance to usual treatment are characteristic features.

Dislocation of the hip is another deformity commonly found in this syndrome, usually bilateral when it occurs. Several features of the dislocation differentiate it from the usual congenital dislocation of the hip, so that it is well to classify the lesion as an embryonic dislocation of the hip, as it truly develops during embryonic life. Owing to the marked rigidity it is rarely possible to reduce the dislocation by manipulative measures. The dislocation is usually of the anterior type, with the development of a marked depression of the anterior margin of the ilium due to hypoplasia from the malposition of the head resting on the margin. The abduction and external rotation attitude of the hip are also characteristic only of the embryonic dislocated hip.

3. *Posture of the Limbs.*—In addition to the extended fixed positions of the extremities there is a posture of the limbs characteristic of this syndrome only. This is characterized by lack of sharp differentiation of the trunk and the pectoral and pelvic portions of the extremities. The arms hang to the sides of the trunk with the elbow in extension, the olecranon points outward and the cubital fossa points toward the trunk. The club hands deviate palmarward toward the trunk. The lower extremities present also a typical posture, with abduction of the hips usually associated with extension of the knees and the entire limb in marked external rotation (the reverse of the upper extremity, which is internally rotated). The patellas point outward and the popliteal spaces face each other. Usually the clubfoot is a typical talipes equinus varus, but may be a valgus type.

4. *Muscular Abnormalities.*—Atrophy, lack of differentiation and partial paralysis of the muscles of the extremities occur in a rather characteristic pattern, with marked atrophy and weakness of the deltoid and atrophy particularly in the pectoral region but also throughout the extremities.

Theory of Embryonic Arrest

I have recently published a theory to explain the pathogenesis of the various features of this syndrome.

1. The rigidity of the joints may well be a result of the partial paralysis and degeneration of muscle fiber in the extremity muscles which Middleton has demonstrated as the primary pathologic change in this syndrome. Embryologic experimental work with transplanted limb buds with regenerating paralyzed muscles shows the same tendency of fixation of joints. It is quite possible that, although motion may not be a necessary factor in the embryologic development of the joints, fetal movement is necessary to maintain mobility. The articulations in arthrogryposis multiplex congenita are usually normally formed, and the fixation is generally periarticular and tendinous rather than intra-articular in type. Hamberger, in a study of the skeletal development in nerveless limb transplants, stated that although joint formation may be almost perfect and complete, fixation of the joints is found in the majority of cases.

2. The characteristic posture of the limbs in arthrogryposis is definitely akin to an arrest in development, with failure of normal rotation of the

limb buds. This is an arrest of posture analogous to that seen normally in the third month of fetal existence. The turning outward of the elbows and the knees, the external rotation of the legs and the internal rotation of the arms are characteristic early fetal positions prior to the rotation of the limb bud characteristic for the human species. It is difficult to account for this characteristic posture by any other mechanism, and the striking similarity of the fetal attitude to this syndrome must be of great significance.

3. The congenital club feet and club hands are also strongly suggestive of embryonic arrest of the characteristic positions of the hands and feet at the third month of embryonic life. The arrest of development of the hind foot in a fetal position which prevents normal rotation in the development of the foot has long been advanced by Max Böhm as the etiologic factor for clubfoot.

4. The partial paralysis and the atrophy of muscle have been explained by Middleton and also by Sheldon as the primary feature of the lesion. I am in agreement with them that the characteristic deformities of arthrogryposis multiplex congenita are the result of interference of function of the musculature of the extremities. The intrinsic design of the human extremities for the upright attitude makes necessary the rotation of the limb buds. This rotation is produced normally by the characteristic origin and insertion of the muscles. The primary involvement of the musculature with its resultant loss of function can produce an embryonic arrest of the rotation and may well be the primary factor for the production of all the associated deformities of this symptom complex.

I therefore, advance the theory that the pathogenesis of the multiple deformities occurring in arthrogryposis multiplex congenita may best be explained on the basis of arrest of embryonic development. A primary pathologic change of the muscle which has been proved inherent in the lambs, but of unknown etiology in human beings, can well be the causative factor of this arrest. The normal rotation of the limb buds, an intrinsic characteristic of the human fetus, is carried out by the muscles of the extremity. The loss of muscle function arrests or prevents this rotation. The resultant club feet, club hands and postural deformities are the retained posture normal for the 3 month fetus, but arrested from rotation into the characteristic human attitude. The rigidity of the joints is similarly the result of failure of muscle function to prevent normal fetal motion in otherwise normally developing joints.

Rehabilitation

With this theory as a background, rehabilitation of the patient with arthrogryposis multiplex congenita becomes a much simpler problem. The peculiar features of the condition make it necessary to utilize a therapy based on the characteristics of this syndrome, rather than to follow the routine procedures, although of proved value, for the usual congenital deformities, such as club feet, club hands, and congenital hip dislocation which have been found inadequate for these deformities.

Thus, the embryonic hip dislocation rarely will respond to closed manipulation, yet open reduction of the dislocation can readily be accomplished. The earlier reduction is obtained, the earlier mobility of the joint can be instituted. Our theory that rigidity of the joints is primarily produced by the immobility of the fetal extremities emphasizes the importance of early mobility in the treatment. Early operative reduction of the hip is indicated.

Similarly, the deformity of clubfoot, due to the rigidity of joint structures and contraction of soft tissue, with partial paralysis and poorly dif-

ferentiated muscle tissue, makes the conservative rules for the usual treatment of congenital clubfoot frequently untenable. Early operations with soft tissue release, particularly of the achilles tendon, posterior capsulotomy if indicated, and release of the deltoid ligament, may have to be performed to obtain correction of the highly resistant, rigid deformities, to mobilize the fixed joints and to correct the deformities.

The rigidity of the knees and elbows likewise will respond frequently to active and passive motion, but if it is not responsive, such treatment should be supplemented early in life by lengthening operations on tendons, muscles and capsules to gain early mobility. The knee joint may require lengthening of the quadriceps and freeing of the capsule to obtain satisfactory motion.

The rotation of the limbs similarly may be developed by the operative reduction of the hip dislocation, the correction of the clubfoot and rigidity of the joints. It may require also rotation osteotomies of the femurs.

Thus, rehabilitation of the patient with arthrogryposis multiplex congenita is based on the therapy found essential for this particular syndrome, and not on acceptance of and diligent adherence to the various conventional treatments established as successful for the congenital deformities, such as clubfoot and dislocation of the hip, which are not of this embryonic origin. The embryonic malformations require much more radical treatment.

Conclusion

In the discussion of arthrogryposis multiplex congenita I have attempted to present a conception of the pathogenesis of the many deformities and dysfunctions characteristic of this syndrome, which is based on the clinical evidence, substantiated by embryologic experimental data both as to the formation of the normal limb buds and as to limb buds with partial paralysis. Embryonic arrest of the inherent rotation of the limb buds produced by a primary muscle degeneration, which Middleton classified as similar to muscle dystrophy, seems the most probable explanation to account for all of the characteristic deformities noted in this syndrome.

Recognition of this pathogenesis of arthrogryposis multiplex congenita is of definite aid in the program of therapy for rehabilitation. Correction of the deformities by release operations to reestablish mobility and to continue rotation of the extremities to the normal posture of mature human extremities is the aim of therapy.

The muscle damage is of course irreparable, but marked improvement in function can be obtained.

The characteristic features of this syndrome are so obvious that once they are seen, recognition is certain. Early treatment, with early operative correction of the deformities if necessary, is advised.



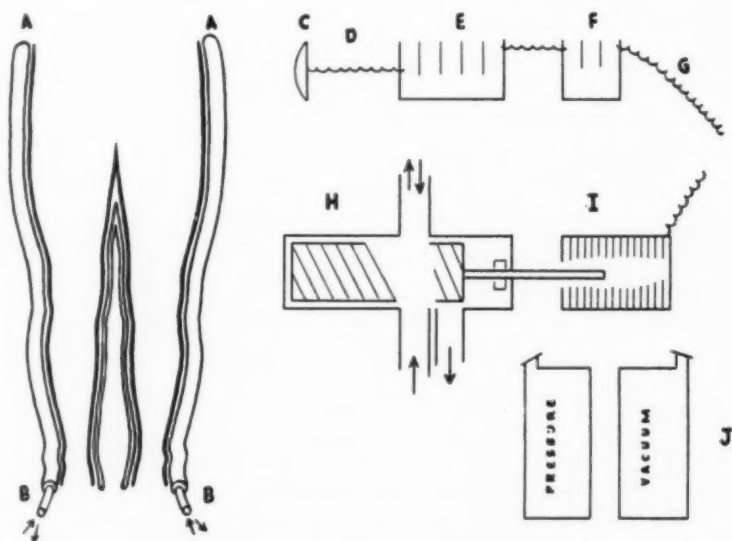
NEW SUCTION AND COMPRESSION DEVICE FOR CIRCULATORY DISTURBANCES

A Preliminary Report

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The heart sounds are picked up by a crystal microphone, which in turn operates an electrical relay. The electrical relay operates a two-way valve. The valve connects and disconnects a vacuum and a compression tank. With the aid of this system the heart systole connects the valve with the vacuum tank and the heart diastole connects it with the compression tank. There is a lightweight linen suit with an air-tight lining which can be inflated with air. The patient



A, air-tight, lightweight, flexible linen suit; B, rubber tubing connecting with pressure and vacuum tank; C, crystal microphone to pick up heartbeat; D, shielded wire from microphone to amplifier; E, amplifier; F, relay; G, wire from relay to electromagnet; H, valve which connects and disconnects pressure and vacuum tank; I, electromagnet; J, pressure tank and vacuum tank.

puts on this lined linen suit (which comes in three sizes), and during the diastole the suit is inflated with air to a pressure of 120 mm. of mercury; the arms and the legs are under this pressure simultaneously. The pressure can be adjusted to each patient according to his own individual blood pressure. During the diastole, when the valve is connected with the vacuum tank and the suit is deflated, the pressure is released from the arms and the legs simultaneously. The pressure and vacuum synchronized with the heartbeat expose both the arms and the legs to pressure and vacuum synchronized with the heart diastole and systole. This promotes the circulation by aiding each individual heart systole with vacuum and each individual heart diastole with compression simultaneously on all extremities.

Summary

1. A vacuum and compression valve is synchronized with the heart systole and diastole.
 2. A lightweight linen suit with air-proof lining is put on the patient.
 3. The linen suit appliance on the body is inflated, synchronizing with the diastole; it is deflated, synchronizing with the systole.
 4. During the systole a vacuum promotes the blood flow to the periphery. During the diastole the compression promotes the return of the blood flow.
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Electric Shock Therapy — Rushton and Aita

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.. EDITORIALS ..



THE SEASON'S GREETINGS

Another year of the world-wide struggle has passed and suffering has increased and will continue to occur. Therefore these yuletide greetings are extended with humility. Perhaps the future looks a little brighter than it did two years ago, if for no other reason than that several years of struggle have gone by and therefore that much less time will have to elapse before "peace and good will toward men" can be resumed in the world. Those who have made many sacrifices in the service of this country may feel that they have little to be thankful for in a personal way, although at least they know that many members of their families are safe and their homes undemolished and undoubtedly will remain protected. This is one more year that all will be extremely hesitant to be merry because of the tragic era through which the world is passing. However, all can rejoice over the turn of events which means victory and the return to normal life.

The Executives of the American Congress of Physical Therapy and the Board of Editors once more take great pleasure in extending the season's greetings and best wishes to the readers of the ARCHIVES at home and abroad.



RECENT DEVELOPMENT IN STUDY OF PHYSICAL MEDICINE

Whereas war, with its instruments of death and destruction, seems on the surface to bring no good, strangely enough it does stimulate man to produce physical objects which are of great benefit to him in peace time as well as in war. This stimulation of production is due not only to the necessity for machines of war but also to the fact that necessity stimulates study and brings recognition to knowledge that may have been neglected previously. These statements seem to be true, to a certain extent, in respect to the field of physical medicine which received impetus in the War of 1914-1918. Rehabilitation in "mass production" then became necessary. Physical medicine did not develop as rapidly as might have been desired. This slow development probably was not the fault of anyone or the times, but was due to lack of knowledge and perhaps lack of sufficient stimulation. The seed was planted and cultivated by only a few and it has taken twenty odd years for the plant to bud and to show evidence of coming into full bloom. The advance of physical medicine suddenly seems to have made rapid strides within the last year. The future seems unusually bright.

A number of factors can be shown to indicate this advancement of the field of physical medicine. The establishment through the generosity of Mr. Baruch of the Baruch Committee for the Study of Physical Medicine should

lend tremendous impetus to the basic research, clinical practice and the teaching in this field. In a few short weeks, surveys are being made. Various committees composed of outstanding medical men and executives are already at work to determine proper steps to be taken in the study and development of this branch of medicine. The National Foundation for Infantile Paralysis, although always interested in the advancement of the use of physical therapeutic procedures, has recently granted financial aid to the University of Pennsylvania for the study of basic physiology and the clinical aspects in the field of physical medicine. This was done after a careful study and it was thought that there was sufficient need for such study to be made. The University of Pennsylvania is now in the process of organizing under the direction of outstanding medical men a department or departments for basic studies in the physiologic and clinical aspects of the field. Likewise, the University of Minnesota recently has considered it necessary and timely to consider the development of a center for basic and clinical research in the field of physical medicine. The University of Kansas, Ohio State University and Duke University also are attempting to develop this branch of medicine. The activities mentioned are only part of the evidence of the stimulation being given to civilian institutions for the advancement of physical medicine. Military and governmental services are moving as rapidly as possible to train personnel for, and to develop, the field of physical medicine in order that it may offer assistance in the basic groundwork in the rehabilitation of the disabled veterans.

Indeed, the plant of physical medicine has taken root and should spread widely from the cultivation it is about to receive. Undoubtedly, the relatively few enthusiasts, perhaps true pioneers, who have helped nourish this seemingly puny plant for many years feel entirely justified for their efforts. The next twenty-five years should place physical medicine well on the road to full development comparable to other specialties. Many of the empiric procedures now used in this field should be proved or disproved and new discoveries made.

W A N T E D

Back Issues of the ARCHIVES

Copies of March, 1941 and of March 1943 of the
Archives of Physical Therapy
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AMERICAN CONGRESS OF PHYSICAL THERAPY
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MEDICAL NEWS

Management of Poliomyelitis

The War Department recently released Circular Letter No. 175, regarding the management of poliomyelitis, which follows in abstracted form:

With respect to therapy, poliomyelitis may be said to present four phases: acute, subacute, convalescent and chronic.

The acute phase includes the onset, which is characterized by malaise, nausea, vomiting, diarrhea and fever either singly or in combination. Rest, support and symptomatic relief are the important aims of therapy during this period. Absolute bed rest is essential. Careful nursing attention must be provided to maintain the affected parts of the body in the most desirable physiologic position, with the least discomfort to the patient. Application of heat to the involved muscle groups is desirable for the relief of pain and tenderness. Heat may be applied by a variety of means, but hot packs are probably of most value. In the absence of pain and tenderness the patient should be allowed to rest without the disturbances of physical therapy procedures. There does not appear to be well established evidence that any special form of local therapy has any controlling or curative effect on the ultimate extent or outcome of the paralysis. The respirator provides rest for paralyzed or weakened muscles of respiration. It is useful generally only when there is paralysis of the intercostal muscles or diaphragm.

The subacute phase begins when the acute illness has subsided, fever, headache and gastrointestinal symptoms have disappeared and the general malaise has lessened. Appropriate orthopedic and/or physical therapy procedures should now be instituted to prevent deformities and to maintain physiologic position. During this period, when muscles are tender and painful, passive movements within the limit of tolerance, as manifested by increased pain, should be instituted by qualified physical therapy aides under the careful direction of medical officers. Active motion, when found to cause increased pain and tenderness, should be discouraged.

With the disappearance of pain and tenderness, poliomyelitis passes into the convalescent phase, which may last for three to twelve months or occasionally longer. It is during this period that maximal recovery of muscle power occurs.

Both orthopedic and physical therapy measures should be adopted which will enhance this recovery in every way possible. These measures will include mechanical support of the affected parts and physical therapy treatment such as massage, radiant or other heat and exercise of passive, assistive, active or reeducational character,

depending on the degree of weakness and extent of paralysis.

When there is no longer improvement in involved muscle groups and residual deficiencies have been stationary, the chronic phase begins. Further corrective measures will ordinarily become the function of orthopedic surgeons, who will be found in the general hospital to which patients are transferred in the convalescent phase.

Bruns General Hospital

The Bruns General Hospital, which was formally dedicated on September 22, is located in Santa Fe, N. M. The hospital was activated on February 18 and the formal flag raising was celebrated April 19, at which time the first patient was admitted. Although the hospital was built with a thousand bed capacity, recent construction will soon afford 1,500 beds. It is of cantonment type composed of open and closed wards, officers' and nurses' quarters, barracks, utility shops, warehouses and a chapel. All the wards, quarters and barracks are connected by either closed or covered walks.

The Bruns General Hospital was named in honor of the late Col. Earl Harvey Bruns, who was recognized as one of the world's leading authorities on pulmonary tuberculosis. The hospital has not been designated as one for any particular specialty, but rather a typical general hospital. It is equipped to care for surgical, medical, eye, ear, nose and throat, genito-urinary and neurologic and psychiatric cases.

Brig. Gen. Larry B. McAfee has been assigned as commanding general of the hospital.

National Rehabilitation Council Appointed

The Administrator of the Federal Security Agency has announced the appointment of the following national Rehabilitation Advisory Council to advise the Office of Vocational Rehabilitation in connection with the expanded federal-state program:

Claud M. Andrews, President, National Rehabilitation Association, Tallahassee, Fla.

Dr. Roma Cheek, Executive Secretary, Commission for the Blind, Raleigh, N. C.

Dr. A. W. Dent, President, Dillard University, New Orleans.

Dr. Kendall Emerson, Managing Director, National Tuberculosis Association, New York.

W. F. Faulkes, Chairman, State Rehabilitation Advisory Council, Madison, Wis.

Dr. M. E. Frampton, New York Institute for the Instruction of the Blind, New York.

Miss Bell Greve, Executive Secretary, Cleve-

land Association for Crippled and Disabled, Cleveland.

Stanwood L. Hanson, Assistant Vice-President, Liberty Mutual Insurance Company, Boston.

Jay Hornel, President, George A. Hornel & Company, Austin, Minn.

E. Jay Howenstine, Executive Secretary, National Society for Crippled Children, Elyria, Ohio.

Monsignor John O'Grady, Secretary, National Conference of Catholic Charities, Washington, D. C.

Howard Russell, Director, American Public Welfare Association, Chicago.

Col. John N. Smith, Jr., Director, Institute for the Crippled and Disabled, New York.

Dr. George S. Stevenson, Council on Rehabilitation, American Psychiatric Association, New York.

Dr. George D. Stoddard, State Commissioner of Education, Albany, N. Y.

Miss Marjorie Taylor, First Vice-President, National Occupational Therapy Association, Curative Workshop, Milwaukee.

Frank G. Thompson, Director, State Department of Registration and Education, Springfield, Ill.

Dr. Philip Wilson, New York Society for Relief of the Ruptured and Crippled, New York.

Miss Catherine Worthingham, President, American Association of Physiotherapy, Leland Stanford University, Palo Alto, Calif.

Miss Betty Wright, American Society for the Hard of Hearing, Washington, D. C.

Second Annual Governor's Conference on Exceptional Children

This conference will be held at the La Salle Hotel, Chicago, December 13, 1943. Specifically, it aims to stimulate interest in exceptional children and their problems; to point out possible solutions to these problems; and to increase through such knowledge the effectiveness of those who would seek their solution. The program in part follows:

"Legislation for Handicapped Children," Mrs. Walter M. Rennie; "The Development and Utilization of the Potentialities of Handicapped Children" through: "Education," discussed by Mrs. Russell Oplinger, Mr. Harold W. Norman and Mr. W. R. Gardner; "Health," discussed by Miss Hedwig Trauba, Dr. Meyer Perlstein and Dr. Raymond B. Allen; "Employment," discussed by Mrs. Frances Karlstein, Mr. Lester J. Schloerb and Mr. Lawrence Zeitz; and "Welfare," discussed by Miss Grace Powers, Mrs. Eleanor Proctor and Mr. Jacob Kepecs. Governor Dwight H. Green will speak on "The Handicapped—A Challenge to Us All."

The Oklahoma Epidemic

Oklahoma was one of the states most severely affected by the 1943 epidemic, ranking seventh of all 48 states in the number of cases reported up through the week ending November 6. According to official figures, a total of 519 cases

was reported as of that date in contrast to a total of 17 for a similar period in 1942.

A study of the statistics reveals the startling increase of incidence occurring in mid-summer. United States Public Health Service figures show that the first case of polio this year in Oklahoma was reported during the week ended April 24 and it was not until the week of June 19 that another new case of polio had been listed.

One week later, however, eight cases were reported. Swiftly the incidence rate rose until by August 7 a high point was reached when 52 cases were reported for the week. Subsequently the rate declined until by the end of October it fluctuated between 22 and 6.

Early in July when sporadic outbreaks occurred Dr. Grady F. Matthews, State Health Commissioner, made available to acute cases throughout the state the facilities of the Crippled Children's Hospital at Oklahoma City. An enlarged polio ward was set up and 120 beds were installed in the event that the disease should strike in strong epidemic force. Unfortunately, that was what happened and soon even the fine facilities of the hospital were taxed to capacity.

Governor Robert S. Kerr, who was State Birthday Celebration Chairman in the 1942 Campaign, asked Basil O'Connor for Foundation aid in the very real emergency facing the people of Oklahoma.

Mr. O'Connor sent Dr. Robert L. Bennett, Director of Physical Therapy at the Georgia Warm Springs Foundation to consult with medical and hospital authorities. Director of Research, Dr. John L. Lavan, visited the epidemic sectors of the state and addressed groups of medical men and the public on "Recent Advances in Poliomyelitis Research." While in Oklahoma he conferred with state and local health officials and Chapter Officers to ascertain their needs and how best the National Foundation might be of assistance. Among those with whom Dr. Lavan advised were Dr. Grady F. Matthews and Joe N. Hamilton, executive secretary of the Oklahoma Commission for Crippled Children, and secretary of the Oklahoma County Chapter.

President O'Connor, in letters sent to all Oklahoma Chapters stated that Chapter funds should be expended freely for the relief of infantile paralysis victims and pointed out that should such funds be exhausted by the demands levied upon the Chapter the National Foundation would advance the money needed to meet the situation "fully and adequately."

Meanwhile, Medical Director, Dr. Don W. Gudakunst, who had been keeping in close touch with Governor Kerr's office, secured skilled physical therapy technicians and sent them to the epidemic battlefield. Among technicians thus "borrowed" were: Miss Caroline Earl (Georgia Warm Springs Foundation); Mrs. Lulu MacMurchie (sent from Minneapolis); Miss Elizabeth Nigh (Indiana Department of Public Welfare); Miss Meredith Nordschow (Iowa Methodist Hospital) and just recently Miss Catherine Seiger, of the Pennsylvania State Public Health

Nursing Bureau, was sent to Oklahoma through the cooperation of Pennsylvania Secretary of Health, A. H. Stewart.

Course in Physical Therapy Discontinued

The approved course of training physical therapy technicians that has been offered by the University of Buffalo School of Nursing, has been discontinued because of the inability to secure the services of a qualified medical director to supervise the training of students. Consequently the name of the school is being removed from the list of approved courses.

Dr. Klumpp Honored

Dr. Theodore G. Klumpp, President of the Winthrop Chemical Company, Rensselaer, on November 3 received the honorary degree of Doctor of Science from the Philadelphia College of Pharmacy and Science in recognition of his "distinguished services in medicinal chemistry."

Dr. Darling Joins National Research Council

George B. Darling, Dr.P.H., President and Comptroller of the W. K. Kellogg Foundation, Battle Creek, has resigned to become associated with the division of medical science of the National Research Council. Dr. Darling joined the Kellogg Foundation in 1932 as associate director. He has been president of the organization since the death of the late Dr. Stuart Pritchard in 1940.

Rehabilitation of the Amputated

Members of the Allied Ex-Service Men's Provisional Committee, drawn from fourteen countries, recently paid a visit of inspection to Roehampton Hospital, the great center for supplying artificial limbs. During this war 2,330 amputations resulting from enemy action and comprising service patients and civilian men, women and children have been dealt with. The visitors met a 14 year old boy from Malta whose legs had both been amputated after an air raid. He was wheeling himself in a chair and had just been swimming. He had arrived in the last month to be fitted with artificial limbs. The wonderful work for the limbless done at Roehampton involves rehabilitation on the mental no less than on the physical plane. A gunner sergeant who lost his right arm above the elbow in Libya eighteen months ago wheeled a heavy barrow

and then wielded a pick vigorously to break up a lump of concrete. An instructor who lost his left arm below the elbow showed how, with special appliances, he can use that arm to saw, drive nails and handle a plane. A young girl with an artificial leg, the consequence of a German bomb, mounted, rode and dismounted from a bicycle with every appearance of naturalness. Another cyclist, a man, had two artificial legs. He not only rides considerable distances but, like others among the ex-patients, stands long hours at a bench every day.

Hygeia Articles on Technical Careers in Medical Fields

A series of articles on careers related to medicine begins in the December, 1943, issue of *Hygeia*, The Health Magazine, published by the American Medical Association. Subjects include occupational therapists, medical record librarians, physical therapy technicians and others who act as technical assistants to physicians. Emphasis is placed on educational opportunities and careers in these professions. The series will be of value to prospective students, members of college and high school faculties and vocational guidance advisers.

Hygeia can be found in the larger public and school libraries and in many physicians' offices. After the series is complete, reprints of these articles can be obtained from the American Medical Association at small expense.

Minnesota Changes Opening Date of Next Course for Technicians

The 12-month course for physical therapy technicians at the University of Minnesota will begin the spring quarter, March 27, 1944, instead of the first summer session (June) as it has in the past.

Registration for the spring quarter will be March 24 and 25. The course will remain a 12-month course.

Correction

In the editorial notice referring to Dr. Ernest J. Jaqua which appeared in the October issue of the *ARCHIVES* two errors were made. Dr. Jaqua is a member, but not director of the Professional and Technical Division, Bureau of Training, War Manpower Commission, and he is former President of Scripps College, having resigned that post a year ago.



BOOK REVIEWS

A TEXT-BOOK OF PATHOLOGY, AN INTRODUCTION TO MEDICINE. By *William Boyd, M.D., LL.D., M.R.C.P., F.R.C.P., Dipl. Psych., F.R.S.C.* Professor of Pathology and Bacteriology in the University of Toronto; formerly Professor of Pathology in the University of Manitoba, Winnipeg, Canada. Cloth. Pp. 978. Illustrated with 490 engravings and 29 colored plates. Price, \$10.00. Philadelphia: Lea & Febiger, 1943.

This is the fourth edition and an excellent revision of this textbook for the student in pathology. In addition to a great deal of new material which has been added, much has been rewritten and condensed and considerable material has been deleted. The principal deletions are the chapter "The body constants in disease," the section on immunity and hypersensitiveness, and much bacteriologic detail in the chapter on "Bacterial infections." These were deleted because the author believed that this material could be dealt with more adequately in books on immunology.

The new additions to the book are discussions of the following subjects: vitamin K and heparin in relation to thrombosis, histoplasmosis, actinobacillosis, liposarcoma, liver necrosis in burns, spread of tumors by the vertebral system of veins, subacute myocarditis of unknown etiology, disseminated lupus erythematosus, virus pneumonia and radiation pneumonitis, cystic fibrosis of the pancreas, lycopodium peritonitis, the renal juxtaglomerular apparatus, the relation of the kidney to hypertension, intercapillary glomerulofibrosis, crush nephritis, non-glomerular and extrarenal uremia, Hunner's ulcer, the relation of blood phosphatase to carcinoma of the prostate, interstitial endometrioma, fibrosin adenomatosis of the breast, Hürthle-cell tumor, Boeck's sarcoid, the Rh factor in erythroblastosis foetalis, Marchiafava-Micheli paroxysmal hemoglobinuria, equine encephalomyelitis, Wernicke's disease and lesions of the intervertebral disks.

Sections which have been largely or in part rewritten include those on the etiology of tumors, cirrhosis of the liver, goiter, acute intestinal obstruction, the pathologic physiology of the spleen, nephrosis, etiologic agents in carcinoma of the breast, arteriolar sclerosis, the etiology of atheroma, of cholecystitis and of diabetes, pyelonephritis, the pathogenesis of lobar pneumonia, constrictive pericarditis, endometriosis, the etiology of poliomyelitis and laceration of the brain.

The author has added fifty-eight new black and white illustrations and fourteen new plates in color. Some of the less satisfactory cuts and plates have been omitted. The outline of the book remains the same.

The author states in the preface of the first edition that his book is not written for a book of

reference, but is intended for the student of pathology, whether undergraduate or postgraduate, not for the practitioner in that subject, such as the pathologist and the professional laboratory worker.

The author stresses the study of pathology from the physiologic standpoint. He states that "the study of morphology and pathological physiology, of altered structure and disordered function, must go hand in hand, greatly to the mutual benefit of both. A world of disordered function lies revealed in any lesion if we only have the eye to see it." He further states: "Pathology is not a pure science. The pathological changes are merely one side of a problem, of which the other side is furnished by the clinical picture." Therefore, the author has preceded the discussions of the pathology of important diseases with a brief summary of the clinical symptoms in an effort to help the undergraduate students to understand better the results of the pathologic lesions from a clinical standpoint.

The book is so written that the student can gain the greatest amount of basic knowledge in the shortest possible time. Most extraneous, controversial subjects are minimized and following each chapter is a list of works to be read if the student wishes to acquire more extensive knowledge. The book undoubtedly remains one of the outstanding textbooks for the students of pathology and, even though the author states that if it is not written for the practitioner of pathology, it can be an important book to any general practitioner of medicine.

AIDS TO TROPICAL MEDICINE. By *J. C. Broom, M.D.*, Bacteriologist to the Wellcome Bureau of Scientific Research, London. Fourth edition, revised. Cloth. Pp. 203. Illustrations 31. Price, \$1.75. Baltimore: Williams & Wilkins Company, 1942.

This little volume, the first three editions of which were written by the late Doctor Gilbert E. Brooke, has been again extensively revised and brought up to date by the present author. The former alphabetical arrangement has been changed to an etiologic grouping of diseases. A section on the typhus group has been added and additions have been made to the section on helminthic infestations. The volume is not intended to be used as a text but rather as a ready reference handbook; therefore, all non-essential material has been omitted. The illustrations are graphic fever records, life cycles of parasites and drawings of individual organisms.

There are ten sections covering diseases caused by ultramicroscopic viruses, rickettsia and bartonella, bacteria, spirochaetes, protozoa, helminths and vitamin deficiencies. There is a chapter on medical entomology and one on the technic of

examinations of blood films and stools. The discussions of the individual diseases are divided into: (1) definition; (2) synonyms; (3) geographical distribution; (4) etiology; (5) pathology; (6) symptoms; (7) diagnosis; and (8) treatment. The book can be recommended to students and practitioners as a concise handbook on tropical diseases.

RESEARCHES IN CLINICAL PHYSIOLOGY.

By Sir *Almroth E. Wright*, M.D., F.R.S. Pp. 163. Cloth. Price, 12s 6d. London: Heinemann Medical Books, Ltd., 1943.

This volume consists of a collection of the author's researches published from 1891 to 1921. For those students or practitioners who have had no instruction in clinical physiology these papers would be of great value. Clinical physiology and the information contained in the volume are usually taught in the American medical schools. However, for those students who desire to review the subject matter presented the book is recommended. The following are some of the subjects discussed: A method of making a sugarless diet for the diabetic; the possible advantages of employing decalcified milk in the feeding of infants and invalids; the influence of carbonic acid and oxygen on the coagulability of blood *in vivo*; the pathology and therapeutics of scurvy; the pathology and treatment of chilblains; the discrimination of physiologic albuminuria from that caused by renal disease and hemophilia. The author presents not only laboratory data but data of many clinical cases which he has treated.

DISCOVERING OURSELVES. A VIEW OF THE HUMAN MIND AND HOW IT WORKS. By *Edward A. Strecker*, A.M., M.D., and *Kenneth E. Appel*, Ph.D., M.D., in Collaboration with *John W. Appel*, M.D. Second Edition. Cloth. Pp. 434. Price, \$3.00. New York: The Macmillan Company, 1943.

Many people, as a result of conventional training, use euphemistic terms such as fatigue and boredom for anger and loss of interest and being upset for fear. There is a cultural sociologic misunderstanding as to the prevalence and importance of emotions. The importance of a sound understanding of the function of emotion in life and its proper guidance is fundamental in these times of stress and strain. The problem of psychiatric therapy is to enable patients to recognize emotions, their handicapping effects and guide and direct rather than deny and suppress them. This is especially important in time of war which throws a tremendous strain not only on the intellect but also on the great emotions of fear, love and anger.

This book offers a brief, readable presentation, in non-technical language, of the essentials of dynamic psychology and the principles of psychiatry and mental hygiene. The discussions in

the book are an aid in treatment, a help out of a maze of nervous and mental disturbances. It is a genuine contribution toward the promotion of the mental health of the individual and the community in general. The emphases are not only therapeutic, but preventive and constructive. It should be read by everyone who wants a knowledge of the common handicaps to successful and happy living as it offers suggestions for the correction of these handicaps.

WHAT YOU SHOULD KNOW ABOUT HEART DISEASE.

By *Harold E. B. Pardee*, M.D., Assistant Professor of Clinical Medicine, Cornell University Medical School; Associate Attending Physician, New York Hospital, etc. Second Edition. Cloth. Pp. 127. Price, \$1.50. Philadelphia: Lea & Febiger, 1943.

This book tells the patient how to follow, intelligently, his physician's directions. For this reason physicians should prescribe this work for their patients especially to avoid the danger of adding cardiac neuroses to an existing organic disease. The work is of interest to physical therapy physicians because of two chapters: "Exercise and Rest" and "Recreation and Climate." It is concise but surprisingly complete. It shows the patient how to understand his own condition, to cooperate in its cure and to avoid the unpleasant results of heart disease. It is highly recommended.

FUNDAMENTALS OF HEALTH. By *Elizabeth Chant Robinson*, M.D., Ph.D., Department of Pediatrics, University of Toronto, Former Fellow in Hygiene, Johns Hopkins University, Baltimore. With Introduction by *H. L. Bryans*, M.A., Ontario College of Education, Toronto. Line drawings by *Henrietta M. Hopper*, A.O.C.A. Pp. 283, with 121 illustrations. Cloth. Toronto: The Copp Clark Co., Limited, 1943.

The author of this stimulating little book has succeeded in condensing into it more practical, lucid and well illustrated material than many of the more bulky and pretentious volumes. There are three main sections of the volume. Section I "How to Keep Healthy" presents brief, but scientifically accurate chapters on the body as a whole, on the bones and joints, on the muscles, on first aid treatment of injuries to the bones; joints and muscles, on posture and the feet, on fresh air and sunshine, on the circulation, on foods and the digestive system, on the nervous system, etc. Part II "Health Through the Ages" portrays health progress in ancient times, decay of health in the middle ages and modern pathfinders of health. Section III "Community Health" contains three chapters: "Some Diseases That Threaten the Nation's Health," "How Preventive Medicine Serves Us" and "How Public Health Services Are Organized." The illustrations are clear, impressive and abundant and

make the authors' narrative vivid. This is a popular health book at a very nominal price that can be safely recommended to any lay person and should also serve as a welcome aid in school courses and general health teaching.

CONVULSIVE SEIZURES. HOW TO DEAL WITH THEM. A MANUAL FOR PATIENTS, THEIR FAMILIES AND FRIENDS. By *Tracy Putnam, M.D.*, Professor of Neurology, and Neurosurgery, College of Physicians and Surgeons, Columbia University; Director of Services of Neurology and Neurosurgery, Neurological Institute of New York. Cloth. Price, \$2.00. Pp. 168, with 12 illustrations. Philadelphia, London and Montreal: J. B. Lippincott Company, 1943.

The subject of epilepsy is clouded by much misconception on the part of the laity as well as on part of the medical profession. A distinguished neurologist has taken the trouble of writing a clear cut, highly informative and encouraging book on the present day status of the diagnosis, treatment and prognosis of "convulsive seizures," professedly with the desire to fill a need which he felt in his own practice. The titles of successive chapters read: "Seizures and Their Causes," "The Diagnosis of the Cause of Seizures," "What the Patient Can Do to Help," "How Bystanders Can Help," "The Principles of Treatment of Recurrent Seizures," "The Outlook for the Individual," "The Outlook for Control of the Disorder," "About Medical Writings on the Subject," "For Lawyers and Legislators Only." Twelve illustrations and a number of tables serve to explain and to emphasize the contents. This is a book which can be read profitably by physicians, nurses, social workers and undoubtedly also by a small group of intelligent lay persons; in its general make-up, inclusion of numerous book-references and cross-references of Putnam's volume is more like a medical text.

THE ANSWER IS YOUR NERVES. By *Arnold S. Jackson, M.D., F.A.C.S.* Pp. 197. Price, \$2.00. Madison, Wisconsin: Kilgore Printing Co., 1942.

The size of this book is no indication of its value, for in this short presentation there is a mine of useful information for physicians and laymen alike. It may serve as a guide to physicians in appreciating some of the all too common symptoms without known organic disease and in instructing their pa-

tients how to understand their difficulties and how they may obtain relief by some practical and easily available measures. For the most part it is entertainingly written which insures that, once started, the reader will finish. One might wonder why thyroid disease is the only organic disorder discussed in any detail, but the author's interest and reputation in this subject makes this understandable and the information authoritative. It would perhaps be more in order to include a warning that some nervous disorders need the attention of a specialist in this field rather than suggesting that incurable mental disorder may be brought on by mental fatigue in attempts to gain scholastic honors. This is, however, an admirable book stressing rational hygienic measures and wide reading should be beneficial.

INDUSTRIAL PSYCHOLOGY. By *Joseph Tiffin, Ph.D.*, Professor of Industrial Psychology, Purdue University. Cloth. Pp. 386, illustrated. Price, \$4.65. New York: Prentice-Hall, Inc., 1943.

Although written with a scientific approach, Tiffin's Industrial Psychology can be understood by those who need this information, is of value even though they are not trained in psychologic methods as well as serves as a handy reference work for specialists. This book deals with the applications of psychology that have been made in industry. These applications are not limited to employee selection and placement. Industrial psychology has also been applied to the improvement of merit rating, reduction of accidents, solution of visual problems, increasing the accuracy of inspection, improvements in training methods and the measurement and improvement of employee morale.

The growth of interest in psychologic methods during the past decade within such organizations as the American Management Association shows that psychology as a technology has been accepted as a tool of industrial management. This book covers the procedures and technics that have been responsible for that acceptance. These technics can be improved. They will be improved as further industrial application of psychology points the way toward desirable modifications. But just as they are now, the industries that have given them a trial have not been disappointed in them.

The psychologic approach to industry has made itself felt in the social scene as well as strongly influencing military psychiatry. The chapters on accidents and safety and attitudes and morale should be read by all those persons responsible in dealing with men or those who have the management of the industrial injured. The book is highly recommended.



PHYSICAL THERAPY ABSTRACTS

The Physical Equipment for Administration of Health Resort Treatment. Herbert Ant, and Walter S. McClellan.

J. A. M. A. 123:695 (Nov. 13) 1943.

This article considers the following subjects:

I. General Plans: Baths, hydrotherapy, hot mineral water packs, massage and special treatments, inhalations, mechanotherapy, mud baths and packs, drink halls, linen and service rooms, attendants' rooms and swimming and mineral water pools.

II. Technical Equipment: Storage, metals used for storage and distributing systems, heating of mineral waters, boiler and pumping plant, laundry facilities, bath house fixtures and equipment: Bath tubs, packs and hydrotherapy.

III. Methods of Cleaning and Sanitation.

Brucellosis. Harold J. Harris.

Bull. New York Acad. Med. 19:653 (Sept.) 1943.

When vaccine therapy fails to bring about recovery, after thorough trial and adaptation to the patient, as it will in perhaps 10 per cent of cases, other methods may be effective. Artificial fever therapy is believed by many careful observers to be the method of choice in cases refractory to vaccine therapy. It is essential to select patients carefully, to know their possible idiosyncrasies to pre-treatment sedatives and opiates and also to know their psychologic reactions to fear-producing situations. Some patients cannot help but think of the treatment cabinet as a coffin and to react badly. The optimum fever level seems to be from 105 to 106 degrees for five hours for from three to six treatments. Good results in Brucella spondylitis and other manifestations of brucellosis are reported from the Mayo Clinic and elsewhere.

Simple Methods for Performing Artificial Respiration. Ralph M. Waters.

J. A. M. A. 123:559 (Oct. 30) 1943.

Artificial means to replace the act of breathing need not be complicated or difficult. Waters summarizes the subject of artificial respiration as follows: If a reasonably robust person ceases to breathe, adequate artificial respiration may sustain life until breathing is reestablished. Only disappointment can result from performing artificial respiration on persons who cease to breathe as a terminal event in the course of disease. Methods are most useful which are instantly available and simple.

When breathing has stopped, do not concern yourself with calling for help, moving the patient, wrapping him in blankets or any maneuver other than keeping up intermittent rhythmic exchange of the atmosphere in his lungs.

Utilize inflation of the victim's lungs from the lungs of the operator, or exchange by manual maneuver, if apparatus is not at hand.

If and when a mask, rubber bag and a cylinder of compressed oxygen are available, fill the bag with oxygen and inflate the lungs by pressing on the bag.

In either case use only sufficient pressure to expand the chest slightly. If one can see or feel the chest begin to expand as one blows or presses on the bag, enough pressure is being used. The amount of pressure necessary may be great if the air passages are partially obstructed. Try to relieve such obstruction as soon as possible.

Allow adequate time for the lungs to empty before inflating them again.

Persist until the subject breathes for himself or until a physician has pronounced him dead.

If water or other substances are thought to be in the mouth, throat, and air passages, work with the patient in the face-down position with the head low if possible.

The Kenny Versus the Orthodox Treatment of Anterior Poliomyelitis. J. Albert Key.

Surgery 14:31 (July) 1943.

The most important difference between the Kenny and the orthodox methods of treating poliomyelitis is that in the Kenny method emphasis is placed on muscle spasm as the most important feature of the disease and efforts are made to relieve this spasm by hot fomentations, while in the orthodox method, flaccid paralysis of muscles is considered the most important feature of the disease and efforts are made to protect and restore function to the paralyzed muscles. The other two symptoms which are stressed by Miss Kenny (incoordination and mental alienation) are recognized under different names, but are treated in much the same manner under each method. However, Key believes that early active exercise of muscles is harmful and tends to prolong the stage of tenderness and contracture and he does not begin muscle training until these symptoms have subsided, while Miss Kenny begins muscle training as soon as possible after the diagnosis of poliomyelitis is made. He also considers splints a useful adjunct to treatment where they are indicated.

The symptoms which Miss Kenny calls muscle spasm are recognized and treated in the orthodox method, but they are called rigidity and muscle contracture and are treated by immobilization in splints or casts to relieve the pain and prevent contractures and the development of deformities. In anticipation of the criticism that even though orthodox treatment has recognized the so-called muscle spasm it has failed to emphasize and treat this

symptom Key states that rest is probably the most important therapeutic measure in our armamentarium and that in order to put a muscle at rest the part should be immobilized. Consequently, the tender, painful contracting muscles are treated by rest. This is obtained by splints or casts. The reason these symptoms have not been emphasized is that they tend to subside when the limb is put at rest. The tendency of the muscles to contract (so-called muscle spasm) subsides when the pain and tenderness disappear and if deformities are prevented this symptom is rarely an important problem under orthodox treatment. It has not been emphasized because it subsides spontaneously.

Climate and Disease. C. A. Mills.

J. A. M. A. 123:551 (Oct. 30) 1943.

Plans for spa therapy should not be made without due consideration of possible climatic and weather effects in the region to be chosen. Spas of the non-stormy Southwest are to be preferred for patients with respiratory or rheumatic complaints, while victims of the metabolic or degenerative diseases will usually benefit more in the calming warmth of the Gulf coast. For low vitality patients of tropical or subtropical areas, a summer sojourn in northern coolness works wonders; however, they should beware of the cold and storms of northern winters. Each patient constitutes a separate problem in his relation to climatic environment; hence final decision must be made by the physician in charge. In reaching that decision the physician should be guided by the general principles of climatic and weather effects set forth by the author.

The therapeutic duties of a physician can no longer be concerned simply with the specific treatment of the disease at hand. He should look further afield for the larger forces affecting his patient's welfare and future health. And, among the outside forces bearing on these more general aspects of existence, climatic and weather influences are of great importance. The most perfect diet cannot lead to physical vigor and high vitality unless the heat generated in its use can be readily dissipated from the body.

Iontotherapy (Ionic Medication, Iontophoresis, Ionization) as an Aid in Ophthalmic Therapeutics. Norman Fleming.

Brit. J. Ophth. 27:366 (Aug.) 1943.

Iontotherapy in ophthalmology is far from being a new form of treatment, but the old methods were somewhat laborious and the results not over encouraging.

The application suggested by the author is six parts of calcium chloride, 1 in 500 with one part of adrenalin hyd., 1 in 10,000; this makes the strength of adrenalin actually used, 1 in 70,000 and has been found possible to get a definite adrenalin effect with a dilution of 1 in 250,000. Only on the rarest occasions is treatment applied directly to the eye for more than two minutes, to the everted lids for 1½ minutes and to the closed lids for five minutes. The author recommends the use of calcium

externally in practically every case; adrenalin in all cases where it is not contraindicated, as when glaucoma is suspected or when a vasodilator is required. Zinc sulphate is used 1 in 400 added to the calcium solution when there is a loss of epithelium or an indolent state of the mucous membrane. Silver nitrate is used, 1 in 1,000 or prontosil soluble, 1 in 10,000 when a powerful antiseptic is required. Atropine sulphate, 1 in 2,000 is used as an alternative to its normal therapeutic use. Acetylcholine is used, 1 in 200 and histamine, 1 in 20,000 to promote vasodilatation and for other purposes. Quinine, eserine, pilocarpine, iodides, salicylates and many other drugs may be used, but a few seem to serve as well as many. It is sound to vary the treatment according to the case and in the treatment of an individual case. The results of treatment can be observed better when they are sufficiently spaced.

The principal feature of treatment by ion transfer is the reduction of congestion and consequently of inflammation. It is therefore of use in all forms of conjunctivitis. Cases are described showing remarkable success even in the treatment of such deep inflammations as scleritis, irido-cyclitis and retrobulbar neuritis. These claims are based on experience gained in the treatment of some thousand cases during the last ten years, in the hospital and in private practice. Ion transfer should be of particular value in the treatment of war casualties.

The Effect of Frostbite on the Sympathetic Nervous System. Nikolain Burdenko.

Am. Rev. Soviet Med. 1:22 (Oct.) 1943.

In a recent report to the Twenty-Fourth All-Union Congress of Surgeons it was found that 2 per cent of the total number of hospitalized patients were found to be suffering from frostbite.

In the present article the author discusses one of the components of a complex reaction of the organism to low temperature. By analyzing the pathogenesis, he has arrived at a logical conclusion on the advisability of physiologically blocking the reflex arc at the beginning of the injurious influence of low temperature. Such blocking facilitates the therapeutic measures recommended in frostbite. These measures serve to reestablish circulation and protect the chilled parts from infection. Infection itself is the result of damaged circulation and therefore the measures undertaken to restore circulation are of primary importance.

A Clinical Study of the Results of Exposure of Laboratory Personnel to Radar and High Frequency Radio. L. Eugene Daily.

U. S. Nav. M. Bull. 61:1056 (July) 1943.

A group of 45 men who were exposed to radar and high-frequency radio, varying from two months to nine years, have been observed for the past twelve months. Periodic physical and blood examinations of these persons have been within the normal range. The reproductive tissues did not seem to have suffered clinically any demonstrable damage, as judged by the number of conceptions and normal pregnancies during the time of exposure of

the fathers to radar. No abnormal or premature alopecias that could be connected with exposure to radar were found. There were no unusual dermatologic manifestations.

During the preliminary and present work on radar and high-frequency radio by personnel who are constantly exposed to the equipment and its emanations, in a shielded and an unshielded condition, there has been no clinical evidence of damage to these personnel. It is thought advisable that directives as to shielding of equipment and periodic medical checkup of personnel be continued to prevent a rather remote possibility of an occasional injury due to overexposure of personnel. It is to be noted that the radio-frequency energy of radar is not different from that of other high-frequency radio or diathermy units of an equivalent average power.

Water Shifts in Deep Hypothermia. Henry G. Barbour; Elizabeth A. McKay, and William P. Griffith.

Am. J. Physiol. 140:19 (Oct.) 1943.

Exposure to cold with retention of protective reflexes leads to a gain of intracellular water throughout the body. When the central nervous system becomes so chilled as to cause general neuro-muscular depression, the effect on the hypothalamus is to abolish the reflex responses to cold, which process includes a reversal of the water shift with increased extracellular fluid. Subcutaneous edema tends to occur and is augmented on rewarming the animal, which procedure increases greatly the hydration of blood.

Experiences With Fever Therapy at the Philadelphia Naval Hospital. William H. H. Turville, and Ferdinand Fetter.

U. S. Nav. M. Bull. 61:440 (March) 1943.

During the 2-year period from July 1, 1940 to July 1, 1942, 1,101 fever treatments were given to 175 patients at the Naval Hospital in Philadelphia. Of 38 patients treated for gonococcal infections, 87 per cent were cured. Significant improvement occurred in 71 per cent of 32 patients treated for neurosyphilis, in 56 per cent of 30 patients treated for rheumatoid arthritis; in 73 per cent of 11 patients treated for bronchial asthma; and in 80 per cent of 5 patients treated for rheumatic infection.

On the basis of this experience, it is believed that fever therapy is the treatment of choice in sulfonamide-resistant gonococcal infections and in dementia paralytica, that it is a valuable adjunctive treatment in selected cases of rheumatoid arthritis, asthma and prolonged rheumatic infections and that it deserves further study in subacute bacterial endocarditis, multiple sclerosis and various dermatoses.

On the basis of the study of electrocardiograms taken before and after treatment in 13 patients, it was found that the T-wave changes in leads 1, 2, and 4 occur in an appreciable number of patients. This emphasizes the importance of a very close watch of the patient's cardiovascular system during a treatment.

On the basis of studies of the blood chlorides

and nonprotein nitrogen before and after treatment in 11 patients, it was found that, if a patient takes and retains the prescribed amount of salt and water during a treatment, there is no danger of either hypochloremia or nitrogen retention occurring.

The Kenny Treatment for Infantile Paralysis. Robert Bingham.

J. Bone & Joint Surg. 25:650 (July) 1943.

Forty-eight patients with infantile paralysis in 1941 have been treated by the methods of Sister Kenny with encouraging and significant results when compared with 12 patients treated by older methods. The presence of the symptoms of muscle spasm, mental alienation and incoordination in the acute stage of the disease has been verified. The important role of untreated muscle spasm in forming muscle contractures and producing deformities has been demonstrated. Treatment by means of rest in bed in a natural position, hot moist packs, passive motion and muscle reeducation has proved successful in relieving these early symptoms when given as Sister Kenny has described. Immobilization by casts or splints is not necessary for the protection of weak muscles or to prevent deformities and is actually harmful in prolonging muscle spasm and preventing the use of the Kenny routines. Patients receiving the Kenny treatment are more comfortable, have better general health and nutrition, are more receptive to muscle training, have a superior morale, require a shorter period of rest in bed and hospital care and seem to have less residual paralysis and deformity than patients treated by older conventional methods. The Kenny treatment is the method of choice for the acute stage of infantile paralysis.

Practical Application of the Kenny Principles in the Management of Acute Anterior Poliomyelitis. George L. Dixon, and Dorothy A. Graves.

Physiotherapy Rev. 23:197 (Sept.-Oct.) 1943.

There is described the use of the Kenny regimen in the treatment of patients during the acute stage of anterior poliomyelitis and some of the results obtained. It is important to note that the personnel involved in giving these treatments was limited to a very strict minimum.

The Treatment of Various Depressive States by Electric Shock. Lewis A. Golden.

Dis. Nerv. System 4:306 (Oct.) 1943.

The importance of recognizing depressive states which mask themselves in various objective and subjective complaints is emphasized. Four cases of depression are reported in detail to illustrate the various types. The course of mental depressions, once recognized and treated by electric shock, can be reduced from years to months, and perhaps weeks. The contraindications of electric shock therapy are enumerated. One hundred consecutive cases of depression and 33 cases of psychoneuroses are analyzed from the standpoint of age, sex, duration of illness and result of treatment. Eighty-six of the

100 patients suffering from depressive states were improved following electric shock therapy.

Effect of Exercise on Soldiers With Effort Intolerance. Maxwell Shaw Jones, and Ronald Scarisbrick.

Lancet 2:332 (Sept. 11) 1943.

The effort response in 10 patients giving a life-long history of effort intolerance and in 16 normal controls has been studied, using a bicycle ergometer. The amount of work done before reaching complete exhaustion was considerably lower in the patients than in the controls. The rise of lactate and fall of pH was considerably greater in the control group than in the patients. In the patients no evidence of deficient arterial oxygen saturation was found either at rest or as the result of exercise and there was no tendency to develop a respiratory alkalosis after exercise. The value of the test as a measure of persistence in spite of physical distress is discussed.

The Treatment of Painful Feet. Robert P. Montgomery.

Wisconsin M. J. 42:788 (Aug.) 1943.

The object of treatment is to correct as far as possible the causes for fatigue and to learn the strain on the feet by the proper use of the feet in walking and standing. If the feet are used in a normal heel-toe gait with the feet pointing straight ahead, the muscles supporting the arches will be strengthened as the feet are used. Temporary aids, such as adhesive strapping, padding inside of shoes and alterations on the outside of the shoes, are sometimes necessary. As the abnormal positions of the feet are corrected, the calluses and corns disappear without other treatment.

Acutely painful feet and aching leg muscles can be readily relieved by relaxation in a tub of warm water for one or two minutes followed by elevation of the legs above the water level for a similar length of time. Five to ten changes in position are usually adequate. An additional aid can be added by voluntarily dorsiflexing the feet, bending the toes toward the soles of the feet and at the same time turning the soles of the feet towards each other while the legs are elevated. These positions should be maintained throughout the two minutes period of elevation. They assist the position of elevation and the coolness of the air against the moist skin in driving the blood from the muscles and, by so doing, allow a greater volume inflow of blood when the legs are relaxed. This rapid exchange of large quantities of blood into and out of the tired leg muscles in the form of vascular massage is comforting.

Sometimes, but rarely, developmental abnormalities and other complicating factors of foot strain require such treatments as manipulations under anesthesia, the wearing of plaster casts, and operations.

Observations on Injury and Repair of Peripheral Nerves. Hiram E. Essex, and Nilson de Rezende.

Am. J. Physiol. 140:114 (Oct.) 1943.

Observations have been made in vivo of the repair of the posterior auricular nerve of the rabbit after injury had been done to the nerve in a variety of ways. By the use of transparent chambers and intravital straining, injury and repair of nerves could be observed. The transparent chamber and its application to the ear are described.

Nerves were observed subsequent to crushing, sectioning and grafting with fresh autografts as well as with fresh and preserved homografts.

Regardless of the nature of the injury to which the nerves were subjected, the first occurrence thereafter was the development of a complex network of blood vessels which formed in the crushed region, or which spanned the gap between the proximal and distal stumps when the nerve was sectioned or when a part of the nerve was resected. Similarly when a graft was placed in the course of the nerve, it was first completely vascularized whether it was an autograft or a fresh or preserved homograft. Repair of the nerves occurred more rapidly when fresh than when preserved grafts were used.

The results of the work presented emphasize strongly the importance of the circulation in the regeneration of nerves and suggest that after injury to nervous tissue every effort should be made to provide an adequate blood supply for the injured nerves in order that their repair may be facilitated.

Nerve and Tendon Injuries. Sumner L. Koch.

Bull. Am. Coll. Surgeons 28:126 (June) 1943.

"Inflamed and injured tissues need rest." Mason and Allen's excellent experimental study has demonstrated clearly the process of repair in sutured tendons. The first step is exudation, round cell infiltration and soft callus formation, not unlike the early process of healing after fracture of bones. By the end of five or six days, the tendon ends are converted into a soft callus almost gelatinous in consistency. Any tension at this stage simply causes sutures to cut through tendon ends and pull them apart. From the sixth to the sixteen or eighteenth day, fibrous tissue resembling true tendon tissue gradually forms to replace the soft tendon callus. Movement during this period provokes excess of fibrous tissue formation and tends to produce the adhesions to the surrounding tissues that the surgeon wishes to avoid. Both experimental and clinical evidence indicate that the most favorable results will be secured if the part is kept immobilized for eighteen to twenty-one days in such a position that the affected muscles are relaxed as completely as possible. At the end of that period slight active movement is encouraged but with maintenance of the position of relaxation for another week. At the end of four weeks active use is begun, but with care to protect the affected tendons from undue or sudden tension for another three weeks' period.

The same general plan of postoperative care can well be applied if only nerves have been repaired, but this important added consideration must be emphasized: After sutured nerves are soundly healed, the muscles supplied by the nerves in question must be kept supported and relaxed until regenerating nerve axons can make their way into the affected muscles. If paralyzed muscles are left unsupported and unprotected from the constant pull of powerful antagonists, they become hopelessly overstretched and the eventful return of function becomes an impossibility, no matter how carefully and accurately the nerves which supply them have been united.

The Maintenance Treatment of Chronic Psychotics by Electrically Induced Convulsions. Norman P. Moore.

J. Ment. Sc. (London) 89:269 (April) 1943.

Chronic psychotics whose behaviour endangered their health, constituting a serious nursing problem, or whose mental state was one of misery were treated with electrically induced convulsions repeated at intervals, with the object of maintaining the improvement achieved after an initial course of treatment or of cutting short a particular phase of illness. The patients included 37 chronic schizophrenics, 8 involuntal and senile melancholias, 6 manic-depressives, 3 periodic catatonics and 2 mental defectives. All patients responded favorably except 11 of the schizophrenic group.

In some cases treatment has been in progress for over two years. Clinical observation shows no appreciable deterioration in personality or intelligence as a result of continued therapy. The results are discussed and an attempt made to correlate them with theories of convulsion therapy.

The Use and Abuse of Physical Therapy in Dermatology. Harry M. Robinson.

South. M. J. 36:645 (Sept.) 1943.

Every few years it seems opportune for a physician to recount his experiences with the various implements of his profession, new or old, and since physical agents have so largely superseded other methods of treatment in dermatologic conditions, a discussion of the author's experiences with some of these agents, used in the past thirty years, may be of some value. The machines and rays used are familiar to all, but sometimes their use is abused and frequently physician and laity alike help to spread a propaganda that these rays, even properly used, are dangerous.

There are three general rules that the author expounds to all those who would use physical agents in the treatment of skin conditions that if followed would bring about satisfactory results to both the physician and the patient: (1) Know the ray, electrical apparatus, or other physical means to be used. (2) Know its indications and contraindications. (3) Know the diagnosis of the condition that is to be treated.

Electrolysis is of value in a few conditions, but in these conditions this procedure is usually superior to electrodesiccation or other means. It is

the most widely used means by which hair can be permanently removed without leaving blemishes.

For ultraviolet irradiation mercury vapor ultraviolet light is the medium most often employed in this country. Other methods of more or less common use in Europe are rarely, if at all, used here. The Finsen rays apparatus carries too great an expense and the carbon arc light does not produce sufficient rays to be satisfactory.

Although it is true that the ultraviolet rays have a few primary indications, they are nevertheless used as often as any other physical agent. In lupus vulgaris the ultraviolet rays are usually applied with pressure which thereby partially exsanguinates the lesions. In the authors' experience, however, desiccation has given better results. The ultraviolet rays are frequently used in alopecia areata primarily for stimulation purposes and for the same reason in pernio, frostbites, paronychia and sluggish wounds. It is of value in pityriasis rosea, in which an erythema dose is the aim because with an ensuing exfoliation the lesions disappear. It is also of value in some cases of psoriasis, but in this disease it is well to remember that an erythema or burn occasionally causes an exacerbation of the psoriasis lesions.

The Importance of Health Resorts and Their Facilities in Medical Preparedness. Charles R. Reynolds.

J. A. M. A. 13:832 (Nov. 27) 1943.

The importance of health resorts in medical preparedness must be considered in connection with the military situation, the hospitalization plan and the policy governing the disposition of noneffectives during and after active military operations.

The so-called health resorts without substantial natural therapeutic agents and facilities are of value in medical preparedness only as their physical plants or utilities are available when and where needed to supplement the military housing program. Some of these have been useful already as station or local hospitals. Others will prove valuable as military expansion proceeds.

The chief duty of the military medical service is the conservation of effective manpower for the purpose immediately in view. Military operations are complex under all circumstances; the medical service itself, in arranging its hospitalization, must adjust itself to the organization, distribution and operation of the troops it serves. Experience has shown that the establishment of special hospitals is unsound, as is the retention of noneffectives in the military service.

The value of many of the existing spas for military medical purposes is decidedly influenced by their lack of housing facilities for patients, permanent professional staffs, administrative machinery and other facilities for handling groups of men commensurate with their special treatment facilities.

The most extensive employment of spas in medical preparedness will likely be through their acquisition by the Medical Department of the Army or Navy for use as general hospitals with such additions as may be necessary. Their therapeutic appurte-

nances will be valuable in supplementing the physical therapy department, which has become a recognized and necessary service at every large military hospital. Added to this will be, of course, the special program utilizing the natural therapeutic agents of the spas. Through the growth of the military establishment commensurate with the seriousness of present world conditions, the Medical Department of the Army may well find it expedient to designate general hospitals with spa facilities for treatment of certain chronic diseases before discharge or demobilization, as was done to a limited extent during and after the first world war when the empyemas, fractures, osteomyelitis cases and amputations were concentrated in designated general hospitals.

The distribution among spas of individual convalescent patients for special treatment of conditions, many of which are chronic and disabling for the military service, is objectionable for administrative reasons, especially as it severs their contact with the military establishment.

Consideration should also be given to some of the strategically located health resorts for use as convalescent hospitals or camps after supplementing them with military personnel and utilities.

The disease groups for which spa treatment is especially efficacious, digestive, cardiovascular and rheumatic, comprise a large percentage of admissions to sick report in the Army—more than 360,000 from April 1, 1917 to Dec. 31, 1919, many of which became chronic with resulting invalidism.

Spas have a decided value in supplementing the medical service of the civilian population, especially the added requirement incident to war industry. Many of the workers in this group of the population are beyond the military age limit and there-

fore present those chronic ailments, which are becoming more prevalent in the general population year to year and which should be recognized as a real public health problem.

The Intensive Treatment of Gonorrhea and Syphilis. Organization, Objectives, Activities and Accomplishments of the Chicago Intensive Treatment Center Preliminary Report. Herman N. Bundesen, Theodore J. Bauer and H. Worley Kendell.

J. A. M. A. 13:816 (Nov. 27) 1943.

Eight hundred and sixty-six of the 931 patients completed fever-chemotherapy. Sixty-five of the 931 patients did not receive a complete fever-chemotherapy treatment and were removed for the following reasons: Lack of cooperation, 27; persistent mental confusion, 21; cardiovascular fatigue, 6; persistent nausea and vomiting associated with abdominal cramps, 3; extreme generalized body fatigue, 4; mechanical cabinet difficulties, 2 and convulsion, 2.

Patients are dismissed the morning of the third day after fever-chemotherapy if there are no active lesions of the skin or mucous membranes and if other venereal diseases, when present, have been satisfactorily treated. Patients are instructed to return one week after dismissal from the center for clinical and serologic reexamination; thereafter, at weekly intervals until all lesions have completely healed.

A total of 1,786 patients were admitted to the center for the treatment of gonorrhea from Nov. 10, 1942 through Oct. 8, 1943. Of the 1,786 patients, 106 were given artificial fever therapy combined with the sulfonamides.



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Modern Hydrotherapy. II. A Review of Recent Developments. Hans J. Behrend, M.D., Lecturer, Physical Therapy, School of Education, New York University; Associate, Physical Therapy, Hospital for Joint Diseases, New York, N. Y.

Histamin Ion-Transfer. A Five Year Evaluation. Irvin F. Hummon, Jr., M.D., Attending Physician, Department of Physical Therapy, Cook County Hospital; Assistant Professor, Physical Therapy, Department of Physiology, Pharmacology and Therapeutics, Loyola University School of Medicine, Chicago.

The Interpretation and Clinical Significance of Calorimetric and Skin Temperature Measurements of the Extremities. Charles Sheard, Ph.D., Professor of Biophysics, Mayo Foundation, University of Minnesota and Director of Division of Physics and Biophysical Research, The Mayo Clinic, Rochester, Minn.; Grace M. Roth, Ph.D., Instructor in Physiology, Mayo Foundation, University of Minnesota and Associate in Clinical Physiology, The Mayo Clinic, Rochester, Minn., and Edgar V. Allen, M.D., Associate Professor of Medicine, Mayo Foundation, University of Minnesota and Head of Section of Medicine, The Mayo Clinic, Rochester, Minn.

Peripheral Nerve Injuries. Robert E. Kinne-man, Lt. Comdr. (MC), U. S. N. R., U. S. Naval Hospital, Great Lakes, Ill.

Refrigeration. Robert Talbot McElvenny, M.D., Associate Surgeon, Northwestern University Medical School; Attending Orthopedic Surgeon, Wesley Memorial Hospital, Chicago.

Rehabilitation of Injured Workers in Small Plants. Edward C. Holmblad, M.D., Managing Director, American Association of Industrial Physicians and Surgeons; Senior Attending Surgeon, St. Luke's Hospital, Chicago.

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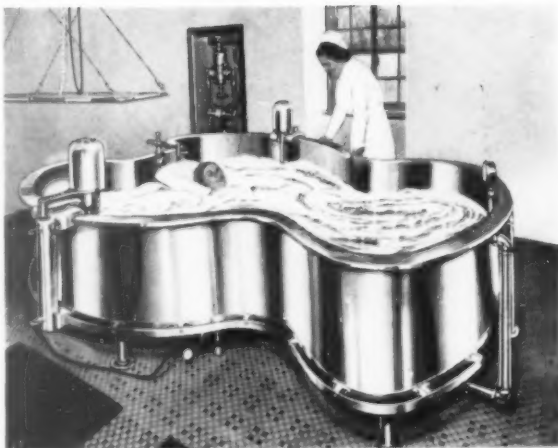
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